



*Personal Computer
Hardware Reference
Library*

Guide to Operations

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Guide to Operations

First Edition (March 1986)

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Warning: The equipment described herein has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with noncertified peripherals is likely to result in interference to radio and TV reception. If peripherals not offered by IBM are used with the equipment, it is suggested to use shielded grounded cables with in-line filters if necessary.

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or TV reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

If this equipment does cause interference to radio or TV reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
- Ensure that card slot covers are in place when no card is installed.
- If peripherals not offered by IBM are used with this equipment, it is suggested to use shielded, grounded cables, with in-line filters if necessary.

If necessary, consult your dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

CAUTION

This product is equipped with a line cord and plug for the user's safety. It is to be used in conjunction with a properly grounded receptacle to avoid electrical shock.

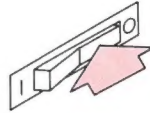
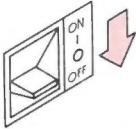
Electrical Safety

Electrical current from power, telephone, and communications cables is hazardous. Connect and disconnect cables as shown when installing, moving, or opening the covers of personal computers or attached devices.

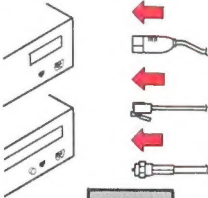
To Connect

To Disconnect

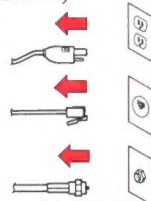
Turn Everything OFF.



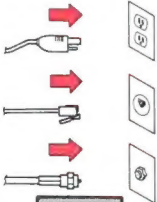
Devices First,



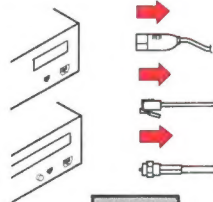
Outlets First,



Then Outlets.

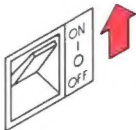


Then Devices.



OK

OK



Notes:



Contents

SECTION 1. INTRODUCTION	1-1
SECTION 2. GETTING STARTED	2-1
SECTION 3. OPERATING YOUR SYSTEM	3-1
Exploring The IBM Personal Computer AT	3-3
System Unit	3-8
Keyboard	3-9
5-1/4 Inch Diskette Drives	3-13
About Diskettes and Drive Compatibility	3-14
Write Protect	3-15
Loading Your Diskette Drive	3-16
Fixed Disk Drives	3-17
Security Key Lock/Indicator Assembly	3-17
Ordering a Key	3-18
Displays	3-19
Time and Date	3-20
Moving Your System	3-20
Long-Distance Move	3-24
Setup at Your New Location	3-24
SECTION 4. INSTALLING YOUR OPTIONS	4-1
Internal Options	4-3
Cover Removal	4-5
IBM Personal Computer AT Math	
Coprocessor	4-10
Diskette Drives	4-14
Display Adapter Installation	4-30
IBM Personal Computer AT	
Serial/Parallel Adapter	4-34
IBM Binary Synchronous	
Communications (BSC) Adapter	4-39
IBM Synchronous Data Link Control	
(SDLC) Communications Adapter	4-41
IBM Game Control Adapter	4-43
Enhanced Graphics Adapter	4-45
Graphics Memory Expansion Card	4-47

Graphics Memory Module Kit	4-48
Professional Graphics Controller	4-49
IBM Personal Computer General Purpose Interface Bus Adapter	4-51
IBM Personal Computer Data Acquisition and Control Adapter	4-53
IBM PC Cluster Adapter	4-55
IBM PC Network Adapter	4-57
IBM Personal Computer AT Prototype Adapter	4-59
Adapter Installation	4-62
IBM Personal Computer AT Floor Standing Option	4-65
Cover Installation	4-76
External Options	4-79
IBM Monochrome Display	4-81
IBM Color Display	4-83
IBM Enhanced Color Display	4-85
IBM Professional Graphics Display	4-87
IBM Personal Computer Display Stand ..	4-89
IBM Personal Computer Color Printer ..	4-93
IBM Communications Cable	4-95
IBM Personal Computer AT Serial Adapter Cable	4-97

SECTION 5. TESTING YOUR SYSTEM 5-1

Appendix A. KEYBOARD TEMPLATES	A-1
Introduction	A-3
French	A-5
German	A-7
Italian	A-9
Spanish	A-11
U.K. English	A-13
U.S. English	A-15

Glossary	Glossary 1
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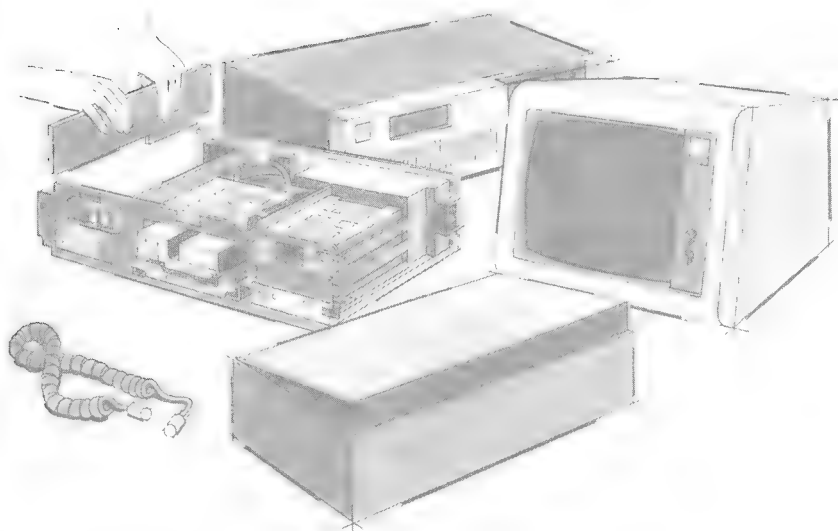
Index	Index 1
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SECTION 2. GETTING STARTED

You are ready to get started. The following steps will help you determine which sections in the *Guide to Operations* to use.

- 1 Have all your *internal* options been installed in your system unit?**

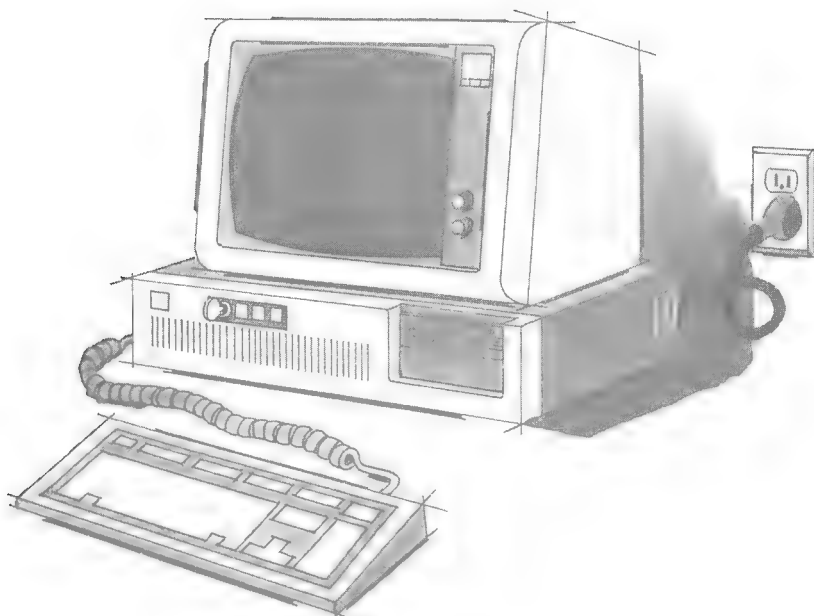
Note: Internal options are parts installed *inside* the system unit such as the adapter your display is attached to.



YES Continue with the next step.

NO Go to "Internal Options," page 4-3.

2 Is your IBM Personal Computer AT cabled and ready to use?



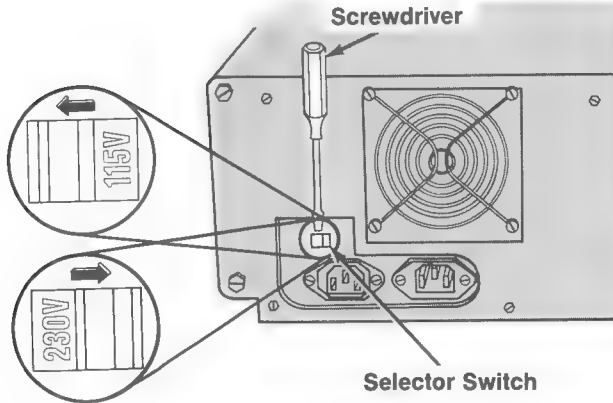
YES Go to "Exploring The IBM Personal Computer AT," page 3-3.

NO Continue with "System Checklist," page 2-3.

System Checklist

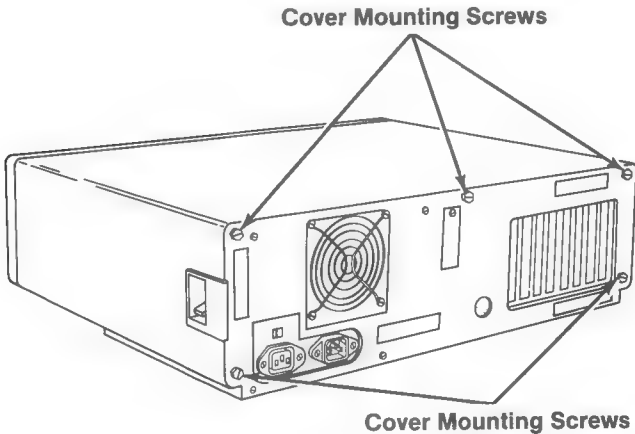
IMPORTANT: Before you connect the power cord to your system unit be sure:

- ☐ The 115V - 230V selector switch is set to the proper position.

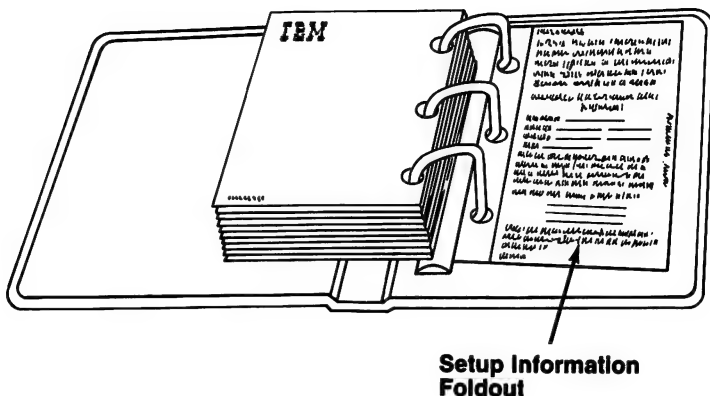


Note: The proper setting for the United States and Canada is 115V.

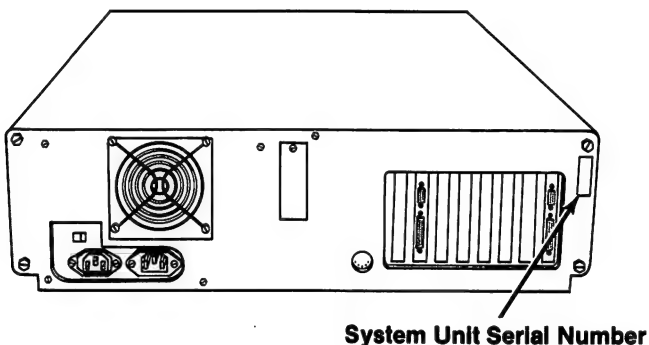
- ☐ The system unit cover is on and the cover mounting screws are installed.



- ❑ Equipment serial numbers and key ordering information are recorded on the “Setup Information” foldout found in this manual.

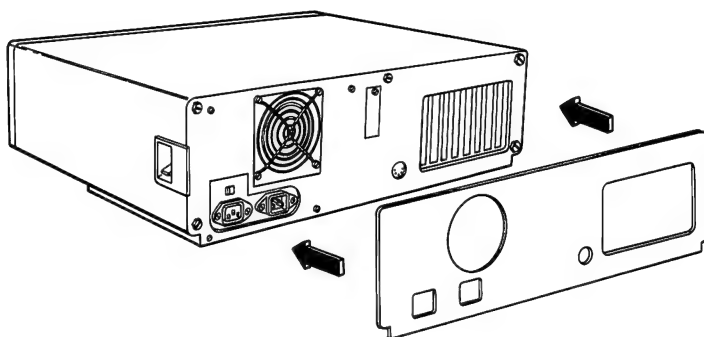
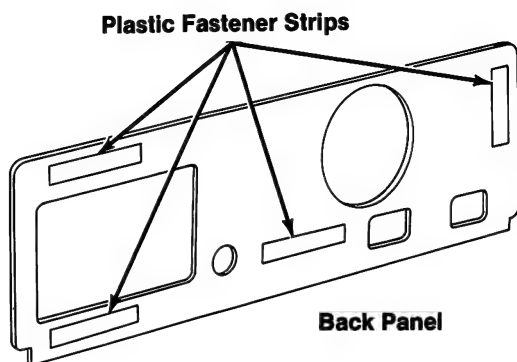


The location of the system unit serial number is shown below.



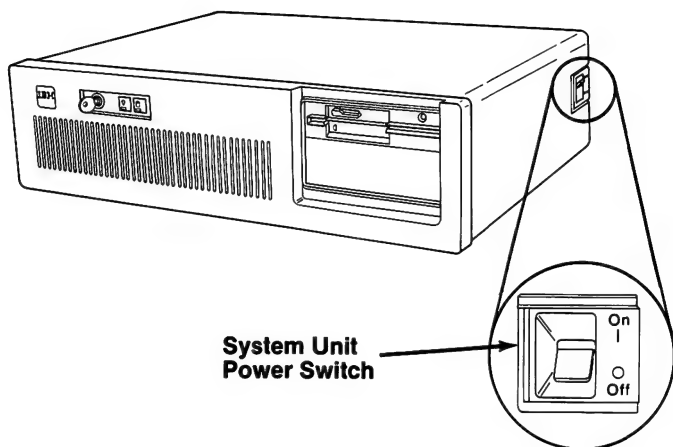
- ☐ The back panel is on.

If this is the first time you have installed the back panel, remove the paper backing from the plastic fasteners.



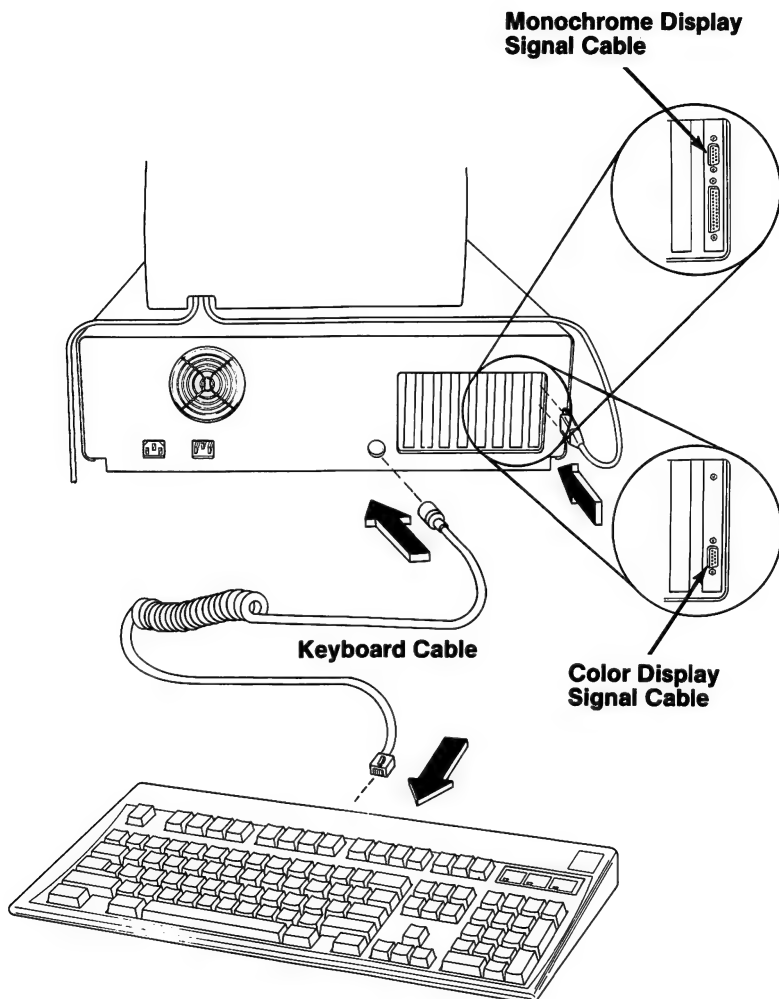
Cabling

- 1 Turn off the system unit.
- 2 Turn off the power to all external options (printer, display and others).



- 3** Connect display and keyboard cables to the system unit and keyboard as shown below.

Warning: Damage to your IBM Monochrome Display may result if it is connected to an IBM Color/Graphics Monitor Adapter.



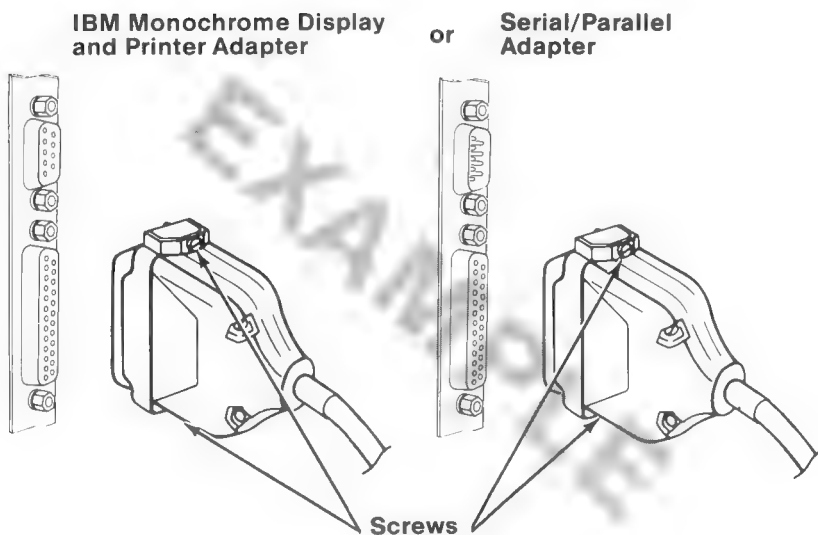
4 Are you installing a printer at this time?

YES Continue with the next step.

NO Go to Step 9 on page 2-10.

5 Connect the printer cable to the appropriate adapter on your system unit.

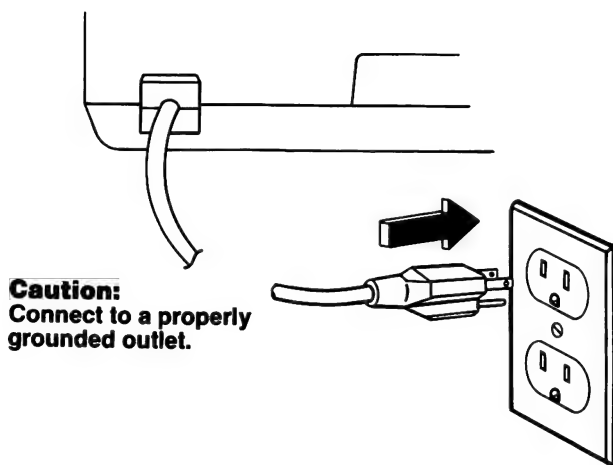
Note: Connect your printer to the IBM Monochrome Display and Printer Adapter, if you have one. Otherwise, connect your printer to any parallel adapter.



6 Tighten the screws.

7 If your printer is not already set up, refer to the instructions that come with it to complete its installation.

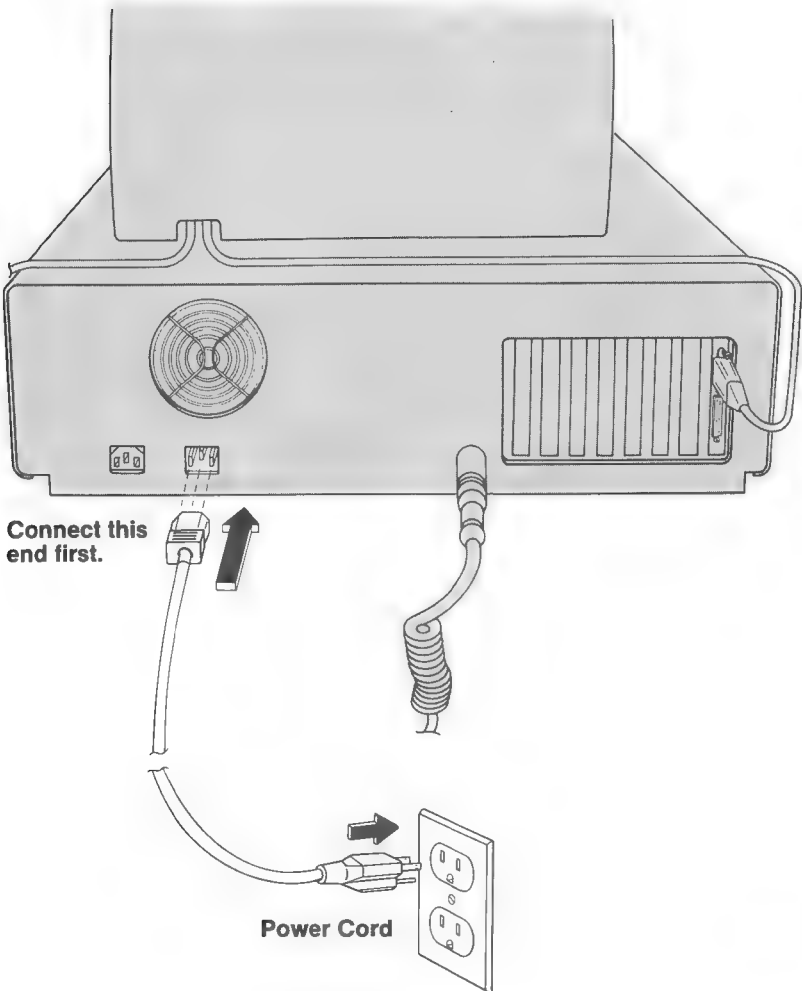
8 Connect the printer power cord to the printer, then plug it into the electrical outlet.



CAUTION

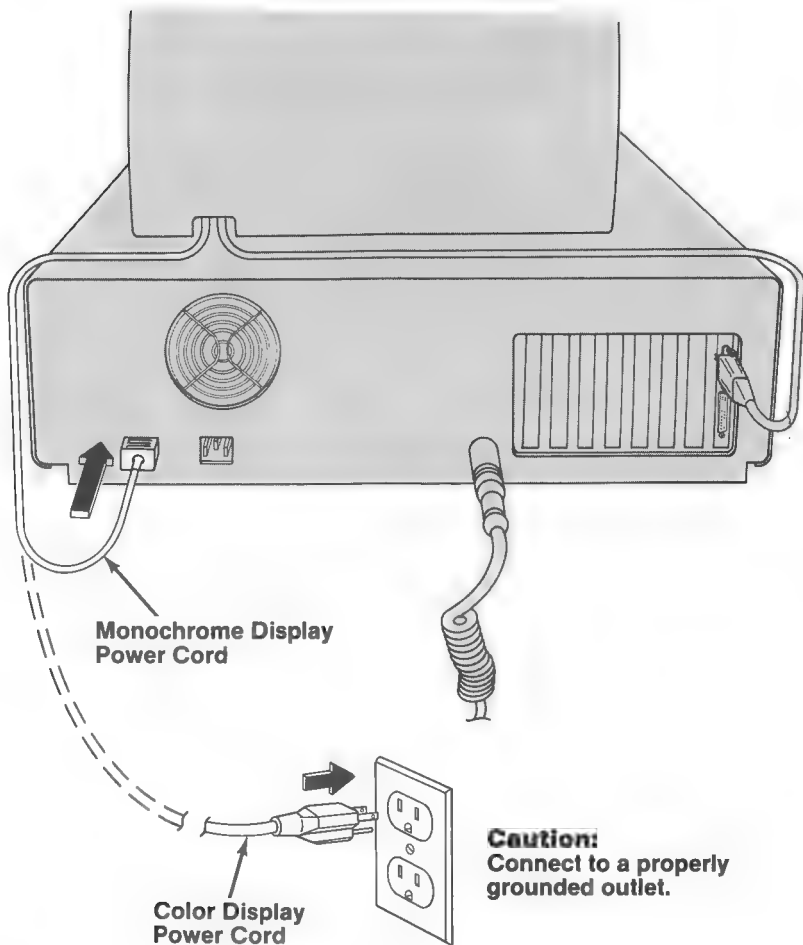
This product is equipped with a line cord and plug designed for the user's safety. It is to be used with a properly grounded receptacle to avoid possible electrical shock.

- 9 Connect the power cord to the system unit, then plug it into the electrical outlet.



- 10 Connect the power cords for other external options as shown.

Note: If your external option has a detachable power cord, connect it to the external option first and then plug it into the electrical outlet.



11 Did IBM or an authorized IBM dealer install all of your *internal* options?

Internal options are parts installed *inside* the system unit such as the adapter your display is attached to.

YES Go to “Exploring The IBM Personal Computer AT,” page 3-3.

NO Continue with “Setup Program” next in this section.

Setup Program

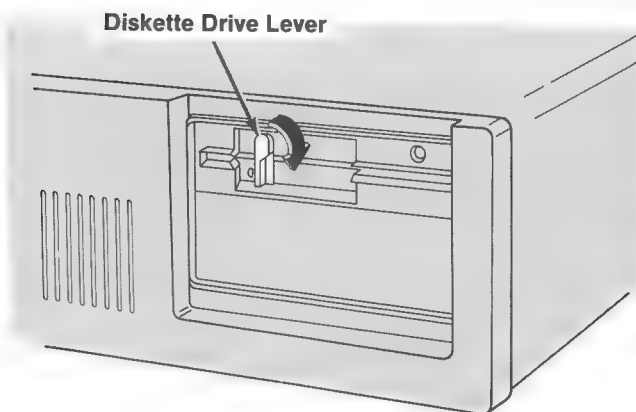
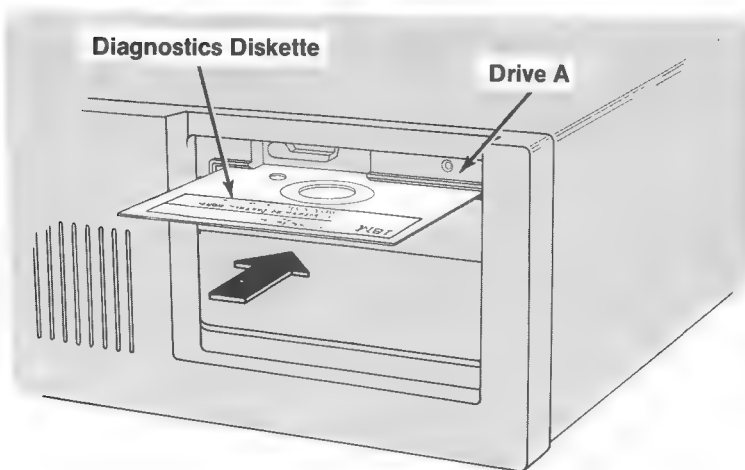
You need to run the Setup program on the Diagnostics diskette to set the date, time, and store information about some installed options. A battery keeps a small portion of memory active to retain this data even when the power is off. Run the Setup program when you:

- Install your system unit for the first time
- Install certain options
- Wish to set date and time
- Wish to set the display mode
- Replace the battery.

To set the system options you must know which options are installed. These options are listed on the “Setup Information” foldout in this manual.

- 1 Turn off the system unit.
- 2 Turn off all external options (printer, display and others).
- 3 Get the Diagnostics diskette located at the back of this manual.

- 4** Insert the Diagnostics diskette into drive A.



- 5** Turn your display controls clockwise.
- 6** Turn on all external options (printer, display and others).

- 7 Turn on the system unit.
- 8 Adjust the controls on your display for eye comfort.
- 9 Did a screen appear with a message similar to the following?

XXX KB OK
16X – System Options Not Set (Run Setup)
(RESUME="F1"KEY)

EXAMPLE

(X can be any number.)

YES Press **F1** and follow the instructions on your screen. Refer to the "Setup Information" foldout as you answer the Setup program questions.

This program allows you to tell your system the date, time, and which options you have installed. Your installed options are listed on the "Setup Information" foldout in the back of your manual.

NO Continue with the next step.

10 Did the following screen appear?

**The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX**

SELECT AN OPTION

**0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS**

**SELECT THE ACTION DESIRED
?**

YES Continue with the next step.

NO Remove the diskette and go to “Testing Your System,” Section 5.

11 Do you want to set the time, date, display mode, or run the Setup program?

YES Press 4 then Enter (↵), and follow the instructions on your screen. Refer to the “Setup Information” foldout as you answer the Setup program questions.

NO Remove the diskette and go to “Exploring the IBM Personal Computer AT,” in Section 3.

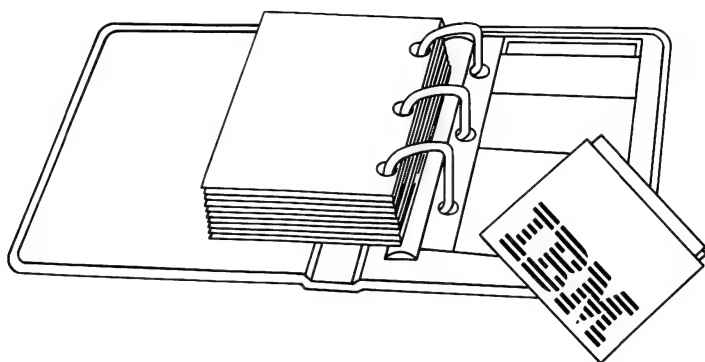
SECTION 3. OPERATING YOUR SYSTEM

Exploring The IBM Personal Computer AT	3-3
System Unit	3-8
Keyboard	3-9
5-1/4 Inch Diskette Drives	3-13
About Diskettes and Drive Compatibility	3-14
Write Protect	3-15
Loading Your Diskette Drive	3-16
Fixed Disk Drives	3-17
Security Key Lock/Indicator Assembly	3-17
Ordering a Key	3-18
Displays	3-19
Time and Date	3-20
Moving Your System	3-20
Long-Distance Move	3-24
Setup at Your New Location	3-24

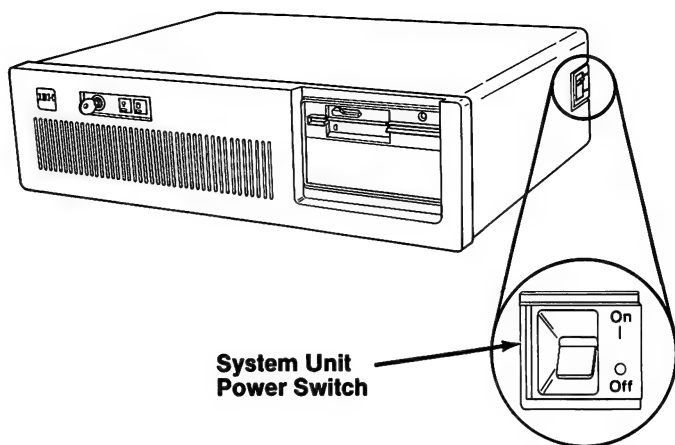
Notes:

Exploring The IBM Personal Computer AT

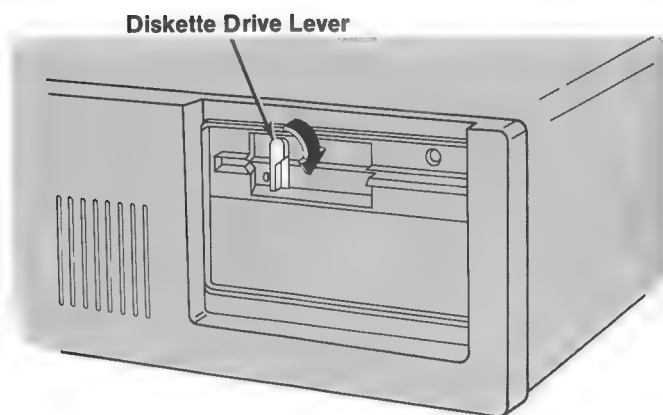
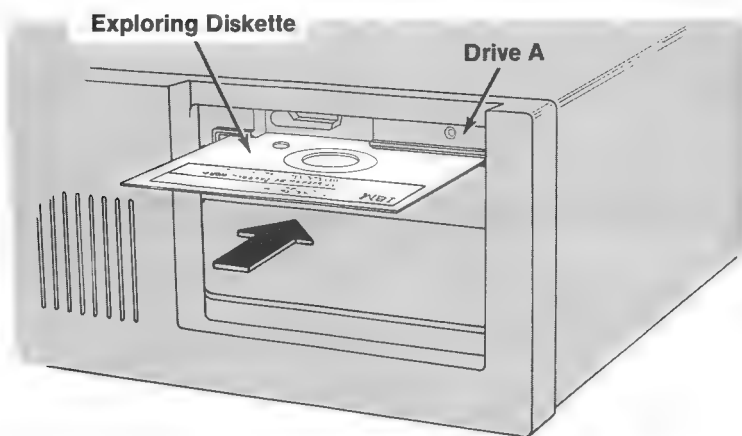
Included with your *Guide to Operations* manual is a diskette called "Exploring The IBM Personal Computer AT." The program on this diskette is designed to help you understand and use your system. Get the "Exploring The IBM Personal Computer AT" diskette from the back of this manual, and continue with the next page.



- 1 Turn off the system unit.

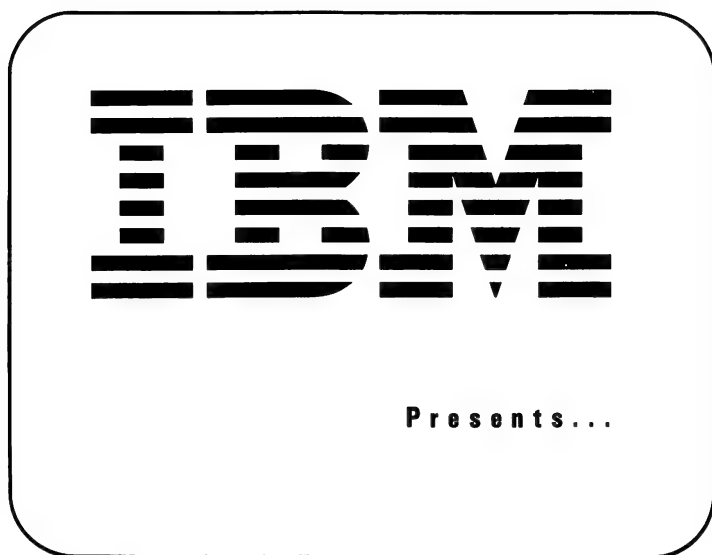


- 2 Insert your “Exploring” diskette into drive A.



- 3 Turn your display controls clockwise.
- 4 Turn on all external options (printer, display and others).
- 5 Turn on the system unit.
- 6 Adjust your display controls for eye comfort.

Does the following screen appear?



YES

Follow the instructions on the screen.

NO

Remove the diskette and verify that:

- It is the "Exploring" diskette.
- It was loaded properly. To verify that the diskette was loaded properly, begin with Step 1 on page 3-4.

If the diskette was loaded correctly, continue with the next step.

Did one of the following messages appear on your screen?

**Your system is in 40-column mode!!
Exploring will only work on a system
set for 80-column mode.**

**Refer to "Setup Program" in your manual
if you want to change the mode.**

**If you do not want to change the mode,
remove the diskette and press
Ctrl-Alt-Del to restart your system.**

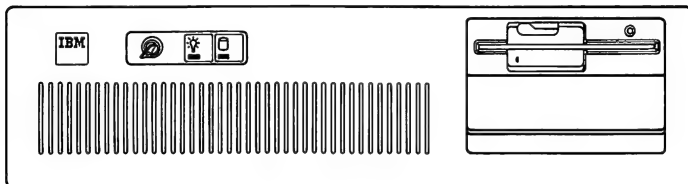
**161 – System Options not set (Run Setup) or
162 – System Options Error (Run Setup) or
163 – Time & Data Error (Run Setup) or
164 – Memory Size Error (Run Setup)**

YES Go to "Setup Program," page 2-13.

NO Remove the diskette and go to
Section 5, "Testing Your System."

System Unit

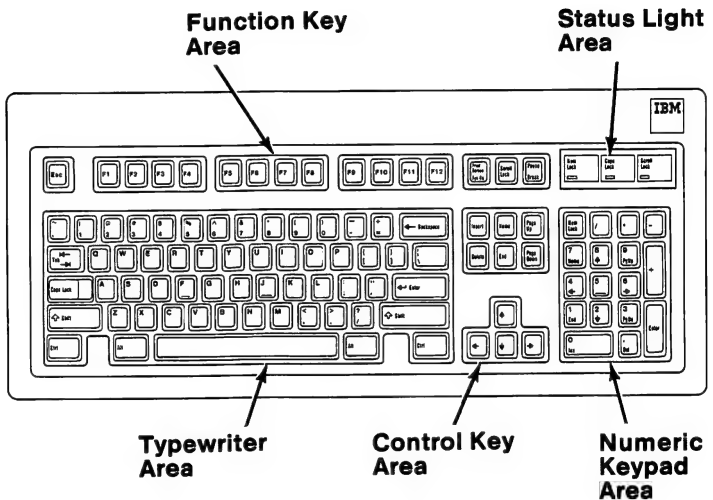
The main part of your IBM Personal Computer AT is the system unit. It processes data and controls the operations of your system through a set of instructions called *software* or a *program*. The IBM Personal Computer AT comes with an installed program language called IBM BASIC. A wide variety of programs are available from your dealer.



Keyboard

The keyboard is divided into five sections: the typewriter area, the function keys, the numeric keypad, the control key area, and the status light area.

Note: The 101-key keyboard is used in these examples. The keytop characters for the 102-key keyboard are shown in the “Keyboard Templates” section of this manual.



Typewriter Area

Most of the keys are typematic; that is, they repeat as long as you hold them down. The keys in the typewriter area are similar to those of a standard typewriter with the following exceptions.

There are two home row identifiers. These identifiers are horizontal ridges located on the F and J keys that allow you to locate the home row without looking at the keyboard.



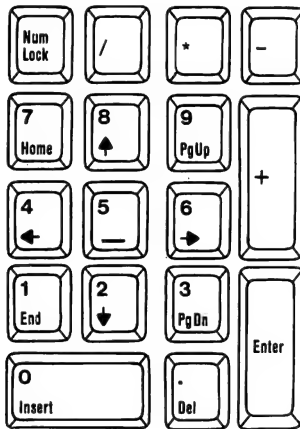
Function Key Area

Twelve function keys, above the typewriter area, are under program control. Their operation is defined in your operating-system or application-program manual.



Numeric Keypad Area

Pressing the Numeric Lock (Num Lock) key one time switches the number keys to cursor keys, and the shift keys work in reverse. While in the **Num Lock** mode, the shift key must be held down to use the numeric keypad as cursor control keys. The keypad is arranged like a calculator to save time when typing many numbers. Pressing **Num Lock** again changes cursor control keys back to number keys.

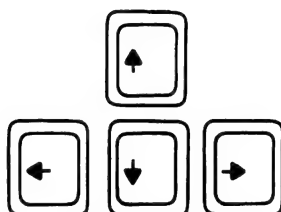
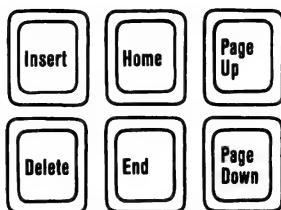


The numeric keypad has an identifier on the 5 key. This identifier is a horizontal ridge located on the key that allows you to locate the center of the numeric keypad without looking at the keyboard.



Control Key Area

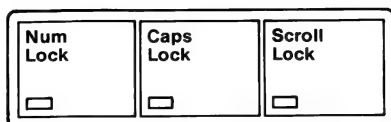
The control keys are used for cursor and program control.



The cursor controls are separate from the numeric keypad and function the same as the cursor controls on the numeric keypad. These keys function as cursor controls only, and are not affected by the **Num Lock** key.

Status Light Area

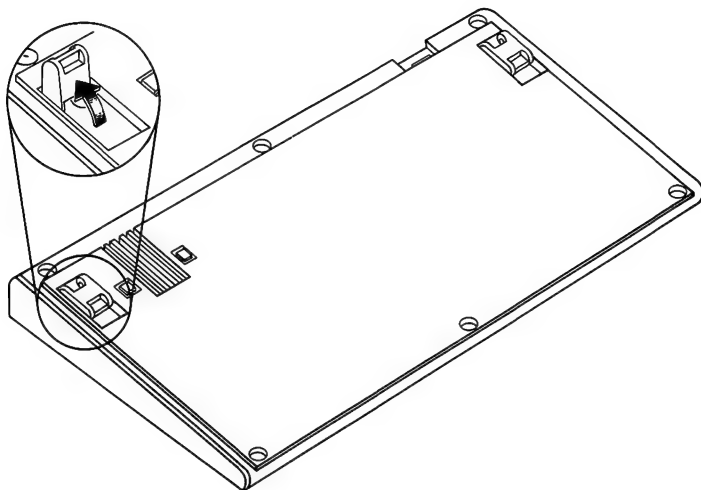
The **Num Lock** light indicates the status of the numeric keypad. The **Scroll Lock** light comes on when you press the Scroll Lock key or when your program is in the scroll lock mode. The **Caps Lock** light is controlled by the Caps Lock key.



Keyboard Height Adjustment

You can adjust your keyboard to two different positions for typing comfort.

To adjust, turn your keyboard over and set both keyboard legs into the desired position.



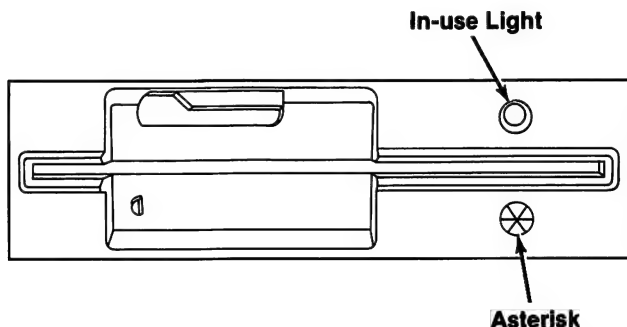
5-1/4 Inch Diskette Drives

Diskette drives are used to read data from and record data on diskettes.

Two types of 5-1/4 inch diskette drives are available for your IBM Personal Computer AT:

- The High Capacity Diskette Drive comes installed in your IBM Personal Computer AT. It stores approximately 1.2M of data on a 5-1/4 inch high capacity diskette.
- The Double Sided Diskette Drive is an option for your IBM Personal Computer AT. It stores approximately 360K of data on a 5-1/4 inch double sided diskette.

The Double Sided Diskette Drive is identified by an asterisk below the in-use light. The High Capacity Diskette Drive has no special markings.



About Diskettes and Drive Compatibility

A diskette is a 5-1/4 inch magnetic disk inside a protective plastic jacket. Diskettes are used to store data.

Your selection of the correct diskette is *important* to the successful operation of your IBM Personal Computer AT.

You can READ the following diskettes:

**with a
Double Sided
Drive**



**with a
High Capacity
Drive**

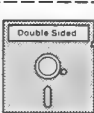
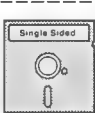


You can WRITE on the following diskettes:

**with a
Double Sided
Drive**



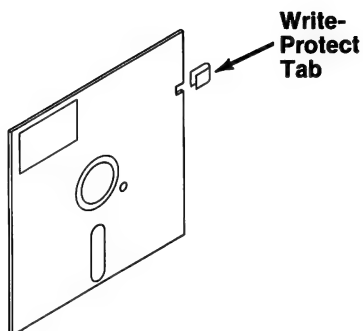
**with a
High Capacity
Drive**



Once you write on these diskettes, you can use them only in a High Capacity drive.

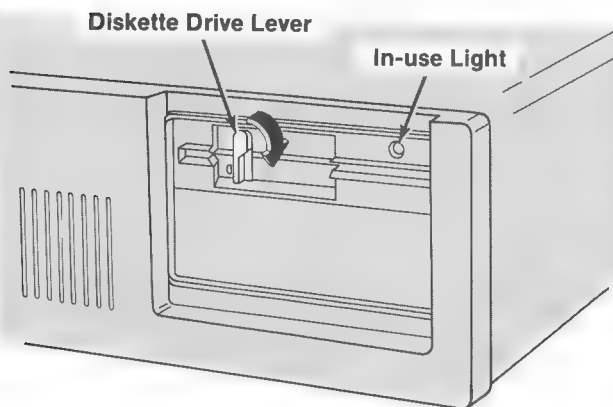
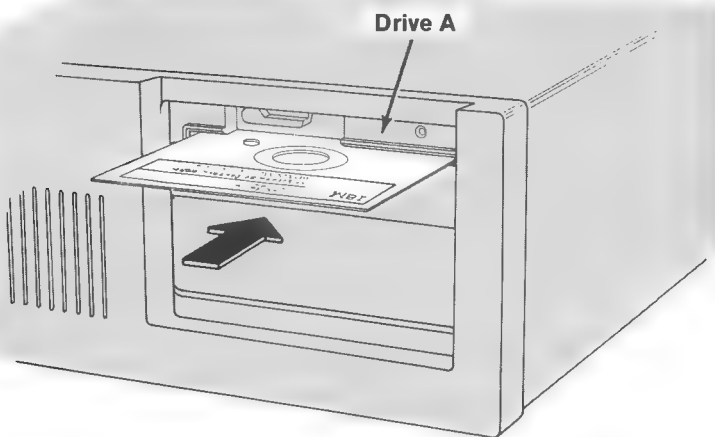
Write Protect

When a diskette is write protected, no information can be written (recorded) on the diskette. To write protect a diskette, cover the notch on the side of the diskette with a write-protect tab. If you want to write (record) information on a diskette, remove the write-protect tab.



Loading Your Diskette Drive

- 1 When you have fully inserted the diskette, it clicks into place. When the in-use light is on, it indicates the system unit is using the diskette drive.



- 2 To remove a diskette from the diskette drive, rotate the diskette drive lever counterclockwise and pull your diskette out. Do not remove your diskette when the in-use light is on.

Fixed Disk Drives

You can use an operating system such as the *IBM Disk Operating System* (DOS) to store and retrieve data from your fixed disk.

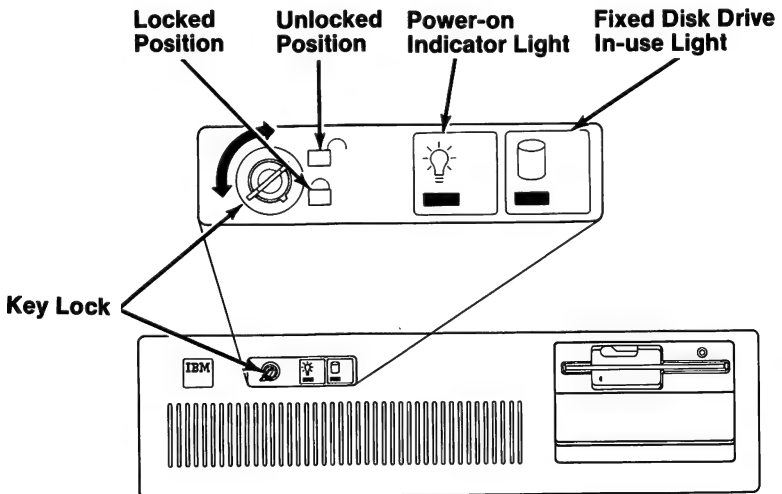
Three drives can be installed in your system:

- One diskette drive and two fixed disk drives, or
- Two diskette drives and one fixed disk drive.

Security Key Lock/Indicator Assembly

The key lock deactivates the keyboard and locks the cover on for security. You can lock the system whether the power is on or off. Turn the key clockwise to lock the system or counterclockwise to unlock it. The key may be removed in either position.

When the system unit power is on, the power-on indicator light is on. When the system unit is using either fixed disk drive, the fixed disk drive in-use light is on.



Ordering a Key

Information for ordering additional or replacement keys may be obtained by writing to the address given on the tag attached to the keys. Be sure to include the lock number (#1501419) and the key serial number. For customers outside the U. S. and Puerto Rico, contact your place of purchase for information on additional or replacement keys. The serial number should be recorded on the "Setup Information" foldout in this manual.

You are responsible for the security of your system. Since the *Guide to Operations* contains serial numbers recorded on the "Setup Information" foldout, it should be considered in your security plan.

Displays

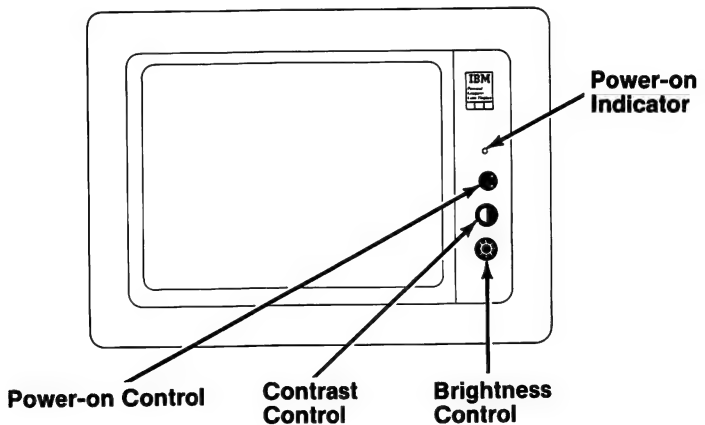
All IBM color displays have a Power control. The Power control turns your display on and off. The Power-on indicator lights when your display is turned on.

Color displays have two modes of operation.

- 40-column mode allows 40 large characters across the screen.
- 80-column mode allows 80 smaller characters across the screen.

You can change the mode by using the Setup program on your Diagnostics diskette. For more information refer to “Setup Program” in Section 2.

The IBM Monochrome display plugs into the rear of the system unit. It is turned on or off when the system unit is turned on or off.



Time and Date

The time and date for your IBM Personal Computer AT can be set using the Setup program on your Diagnostics diskette. For more information refer to "Setup Program" in Section 2.

Moving Your System

Do you have a fixed disk drive?

YES To prevent a loss of data stored on a fixed disk drive, back up all the files before moving your system. (See your disk operating system manual for backup instructions.)

When you have completed backing up your files, continue with Step 1.

NO Go to Step 7 on page 3-22.

1 Load the Diagnostics diskette (found at the back of this manual) into drive A.

2 Turn on the system unit.

- 3 The following appears on your screen.

**The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX**

SELECT AN OPTION

**0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS**

SELECT THE ACTION DESIRED
?

- 4 Press 3 and then press Enter (↵).

- 5 When the following message appears on your screen, your fixed disk drive is ready to be moved.

The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX

SELECT AN OPTION

0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS

SELECT THE ACTION DESIRED

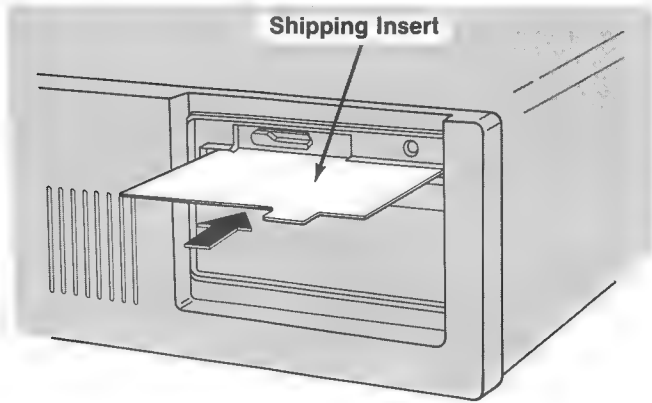
? 3
DRIVE X
IS PREPARED FOR MOVING
TURN SYSTEM OFF
?

(X can be C or D).

- 6 Remove the Diagnostics diskette.
- 7 Turn off the system unit.
- 8 Turn off all external options.

- 9 Put a shipping insert into each diskette drive. Rotate the diskette drive lever clockwise.

Note: If you do not have a shipping insert, use a blank diskette.



- 10 Unplug your system unit power cord from the electrical outlet. Also, unplug any external options.
- 11 Disconnect and secure all cables and cords.

Long-Distance Move

If you saved the original shipping cartons and packing materials that your IBM Personal Computer AT came in, use them to pack your units.

If you are using different cartons, cushion your units well to avoid any damage.

Setup at Your New Location

When your system arrives at the new location, unpack it carefully.

To set up and cable your system, refer to “System Checklist,” page 2-3.

SECTION 4. INSTALLING YOUR OPTIONS

Internal Options	4-3
Cover Removal	4-5
IBM Personal Computer AT Math Coprocessor	4-10
Diskette Drives	4-14
Display Adapter Installation	4-30
Color/Graphics Monitor Adapter ..	4-30
IBM Monochrome Display and Printer Adapter	4-30
IBM Personal Computer AT Serial/Parallel Adapter	4-34
IBM Binary Synchronous Communications (BSC) Adapter	4-39
IBM Synchronous Data Link Control (SDLC) Communications Adapter	4-41
IBM Game Control Adapter	4-43
Enhanced Graphics Adapter	4-45
Graphics Memory Expansion Card	4-47
Graphics Memory Module Kit	4-48
Professional Graphics Controller	4-49
IBM Personal Computer General Purpose Interface Bus Adapter	4-51
IBM Personal Computer Data Acquisition and Control Adapter	4-53
IBM PC Cluster Adapter	4-55
IBM PC Network Adapter	4-57
IBM Personal Computer AT Prototype Adapter	4-59
Adapter Installation	4-62
IBM Personal Computer AT Floor Standing Option	4-65
Cover Installation	4-76
External Options	4-79
IBM Monochrome Display	4-81
IBM Color Display	4-83

IBM Enhanced Color Display	4-85
IBM Professional Graphics Display	4-87
IBM Personal Computer Display Stand .	4-89
IBM Personal Computer Color Printer ..	4-93
IBM Communications Cable	4-95
IBM Personal Computer AT Serial Adapter Cable	4-97

Internal Options

Internal options are parts installed inside the system unit. Some of the internal options available for your system are listed below.

- Memory expansion options
- Display adapters
- Diskette drives
- Printer or communication adapters.

Some options come packaged with instructions written for your IBM Personal Computer AT. If you are installing an option not listed in this book, use the instructions enclosed with that option. Install these options in any order that is convenient for you.

Other options supported by your IBM Personal Computer AT come with instructions for other IBM Personal Computer systems. If you have such an option to install, use the instructions in this manual. These options are listed in the table of contents in the suggested order of installation.

Before you begin installing any internal options, remove the cover using the procedure in this section.

Required Tools

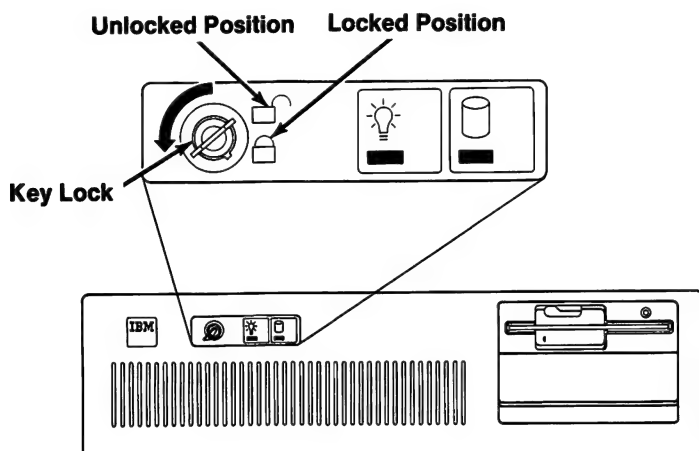
- Medium-size, flat-blade screwdriver
- Small-size, flat-blade screwdriver.

Notes:



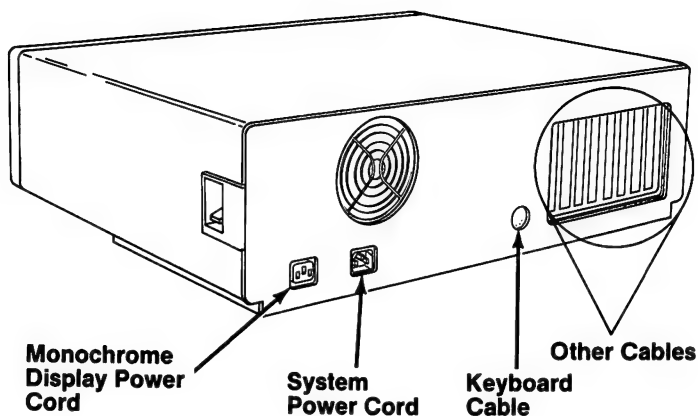
Cover Removal

- 1 Turn off your system unit.
- 2 Turn off all external options (printer, display and others).
- 3 Unlock the key lock and remove the key.

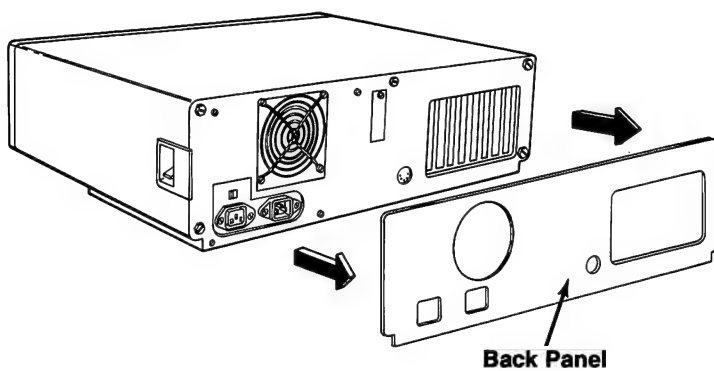


- 4 Unplug your system unit power cord from the electrical outlet.
- 5 Unplug any external options from the electrical outlet.

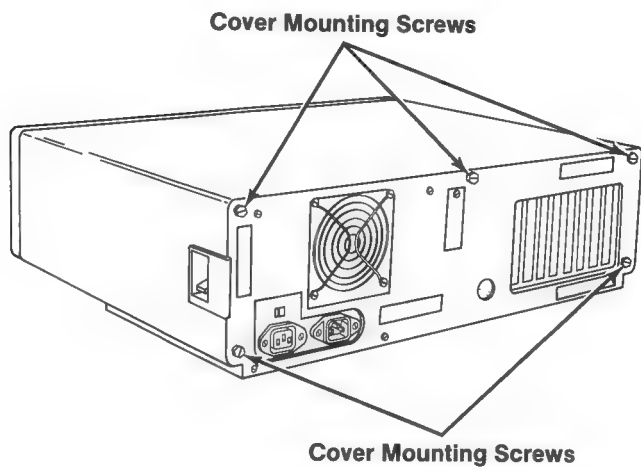
- 6** Note the locations of all cables or cords, and disconnect them from the back of your system unit.



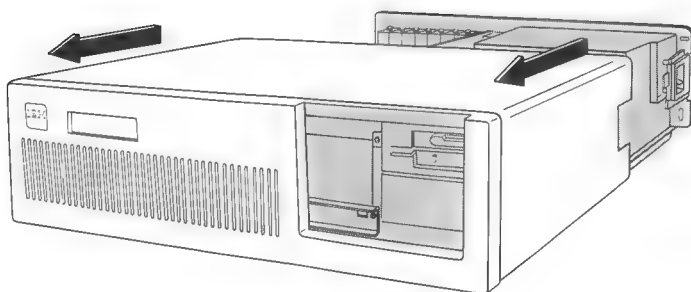
- 7** Remove the back panel from the rear of your system unit.



- 8 Remove the cover mounting screws.



- 9 Remove the cover.



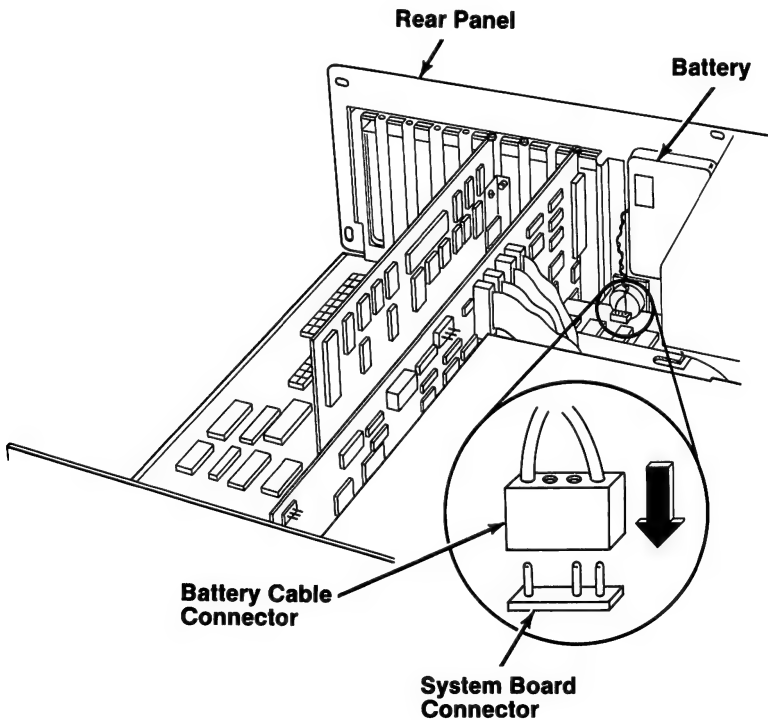
CAUTION

The lithium battery must be replaced with Part Number 8286121. Use of another battery could result in ignition or explosion of the battery. Replacement batteries can be ordered from an IBM authorized dealer.

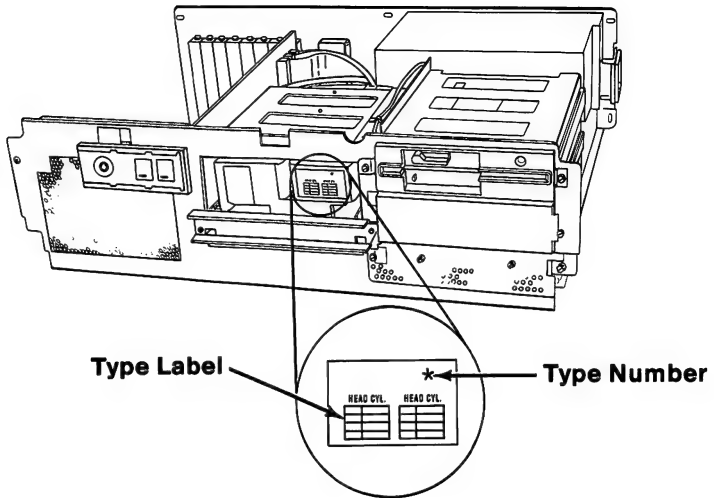
CAUTION

The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge, remove polarized connector, disassemble, heat above 100°C (212°F), incinerate, or expose contents to water.

- 10 Connect the battery cable to the system board battery connector, as shown.



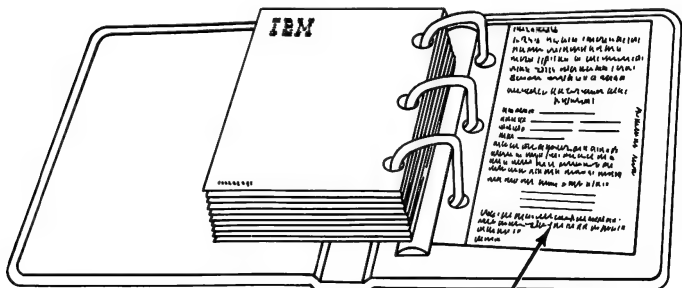
- 11 If you have a fixed disk drive installed and have not recorded the **drive type**, record the **drive type** on the "Setup Information" foldout in this manual.



- 12 Continue with the instructions for the option you are installing.

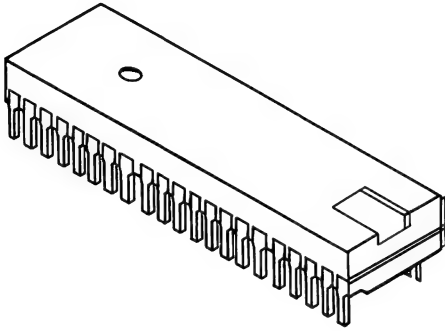
Notes:

- This section's table of contents gives page numbers for options listed in this manual.
- If your option is not listed in this manual, use the installation instructions that came packaged with it.



**Setup Information
Foldout**

IBM Personal Computer AT Math Coprocessor

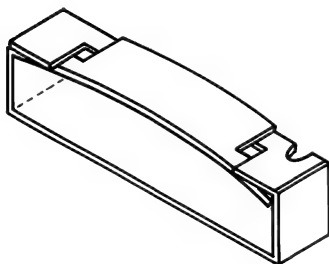
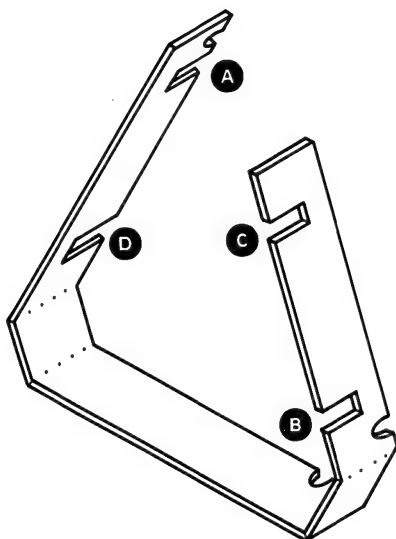


Note: If the cover is not already removed, go to “Cover Removal,” page 4-5.

Warning: IBM’s Limited Warranty applies only to properly installed options. The installation for this option should be performed by a technically skilled person. IBM recommends that IBM or an Authorized IBM Personal Computer Dealer install this option.

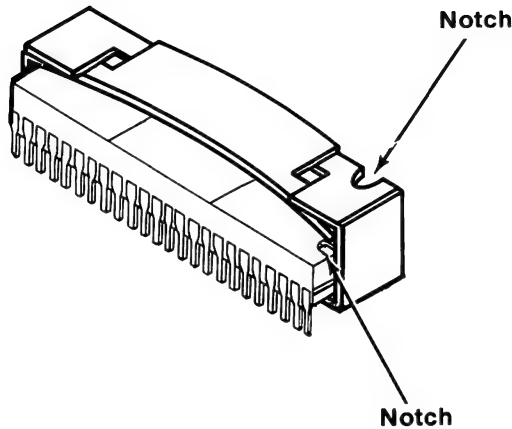
1 Assemble the safety protector as shown below.

- Insert slot **A** into slot **B**.
- Insert slot **C** into slot **D**.



2

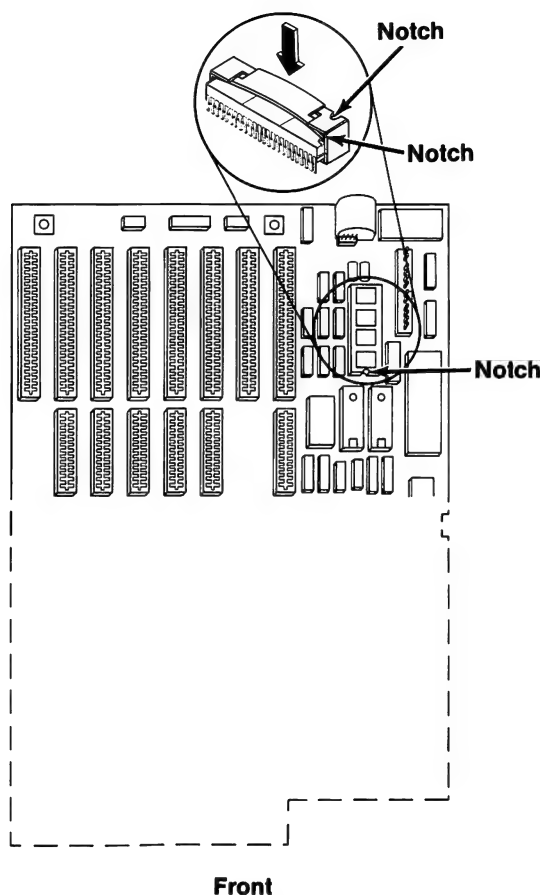
Insert the coprocessor into the safety protector as shown. Make sure that the notch in the safety protector is on the same end as the notch in the coprocessor. The overlapped portions of the safety protector should be on the top of the coprocessor.



Warning:

- The coprocessor is static sensitive. Reduce static by touching the system frame with one hand while installing the coprocessor in your system unit.
- Incorrect placement of the coprocessor can result in damage to the system board or the coprocessor.
- The pins on the coprocessor are bent easily.

- 3 Align the pins of the coprocessor with the connector and press the coprocessor firmly into place. Make sure the notch on the coprocessor lines up with the notch on its connector.



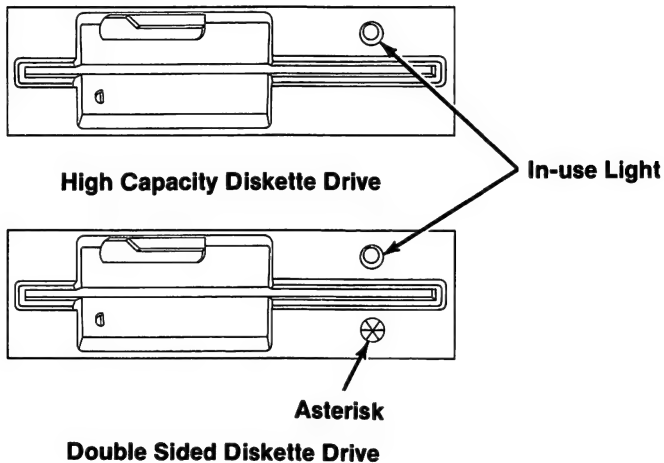
- 4 **IMPORTANT:** Run the Setup program on your Diagnostics diskette after all your options are installed and verify that the installed devices list is correct.

- 5 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-76.

Diskette Drives

Use these instructions to install either of the following as your second diskette drive:

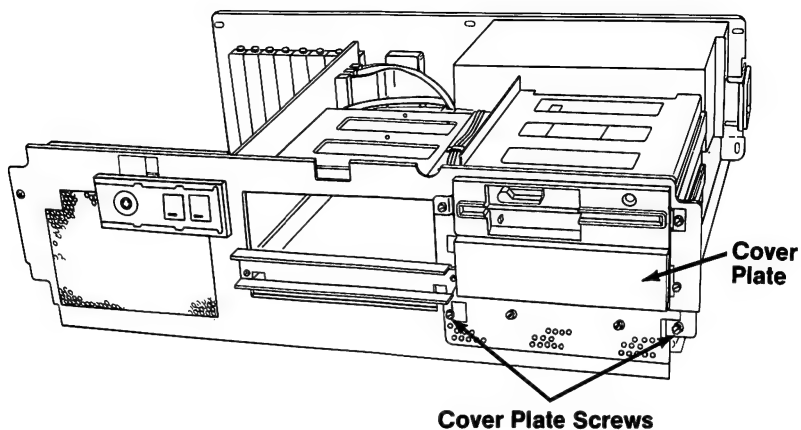
- IBM Personal Computer AT High Capacity Diskette Drive.
- IBM Personal Computer AT Double Sided Diskette Drive.



- The High Capacity Diskette drive has no special markings.
- The Double Sided Diskette drive is identified by an asterisk below the in-use light.

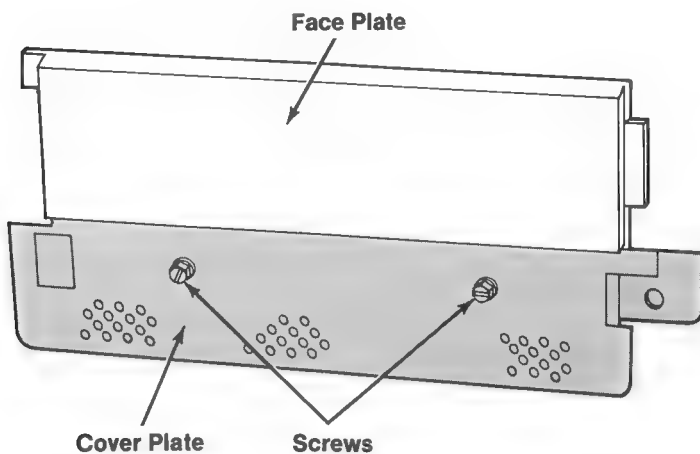
Note: If the cover is not already removed, go to "Cover Removal," page 4-5.

- 1 Remove the two screws holding the cover plate and remove the cover plate. Save the screws for use in a later step.

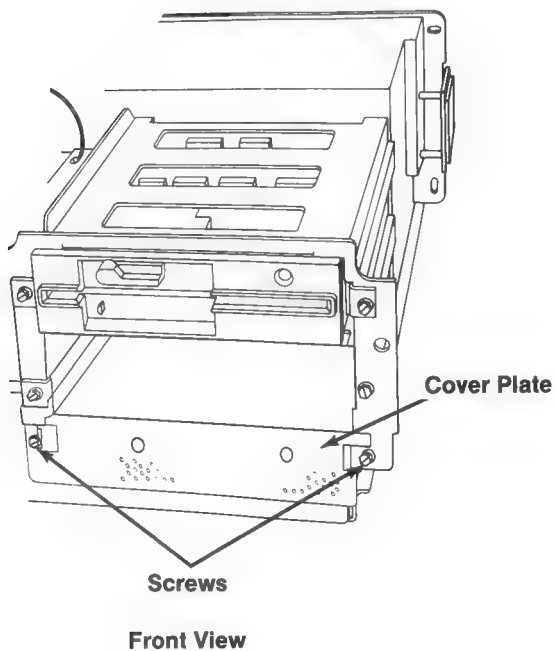


Front View

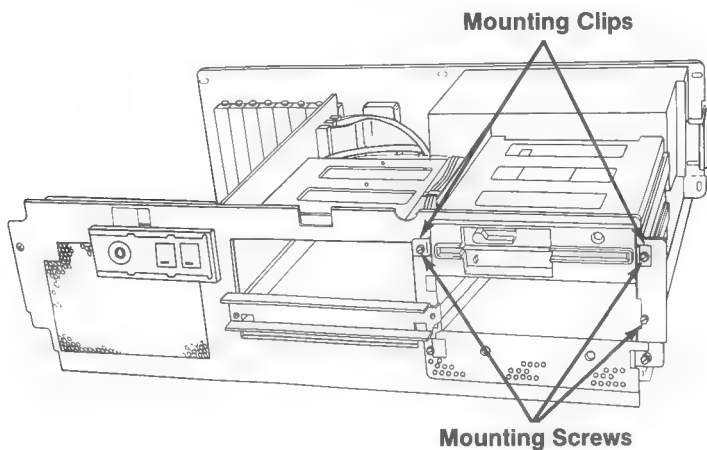
- 2 Remove the two screws and face plate. They are no longer needed.



- 3 Install the cover plate and two screws.

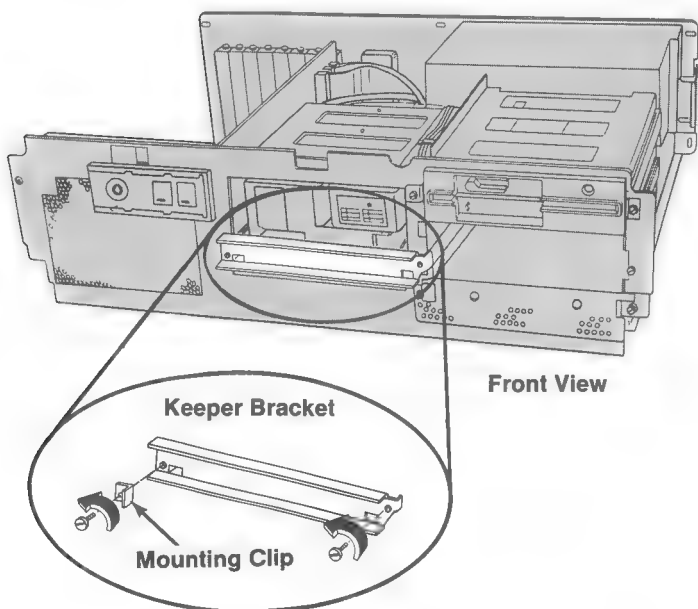


- 4 Remove the three mounting screws and the top two mounting clips.

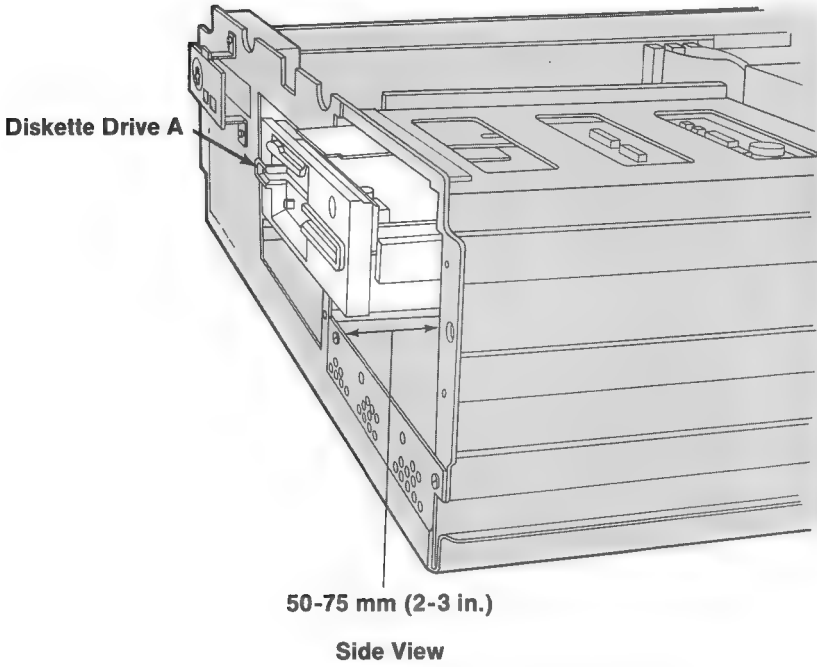


- 5 Remove the two mounting screws, clip, and keeper bracket shown below.

Note: They will be used later to install diskette drive B.



- 6 Slide diskette drive A out approximately 50-75 mm (2-3 in.), but do not disconnect the cables.



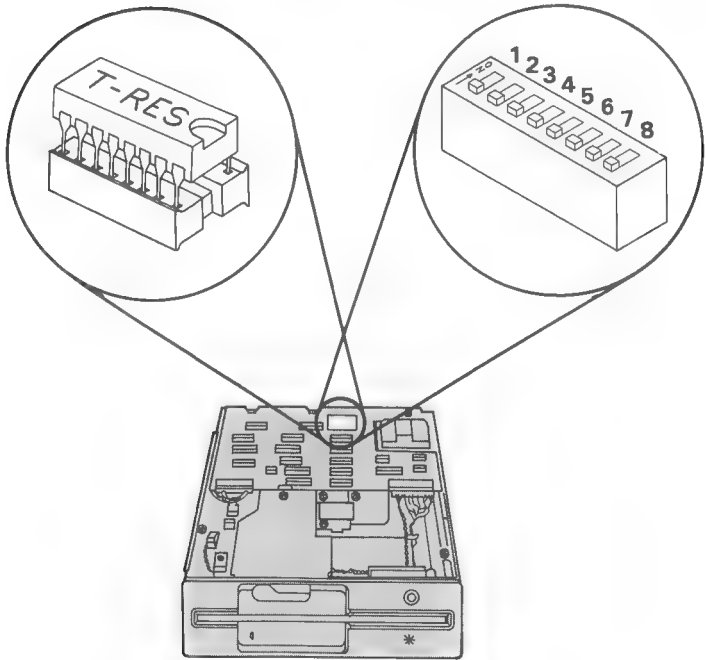
7

Locate the terminating resistor or switch block on the drive you are installing.

- If your diskette drive has a terminating resistor remove it. It is no longer needed.

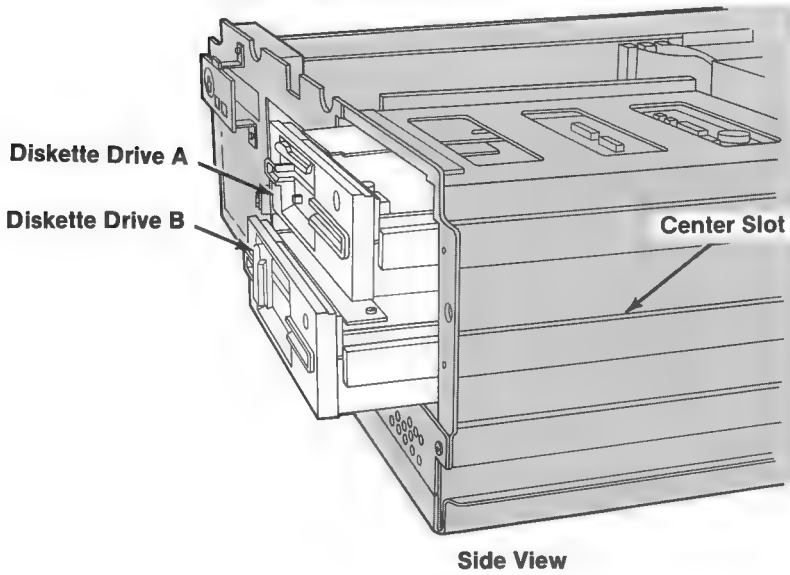
Note: To remove the terminating resistor, insert a small, flat-blade screwdriver between the resistor and the socket and lift up.

- If your diskette drive has a switch block, set all the switches to the **OFF** position.

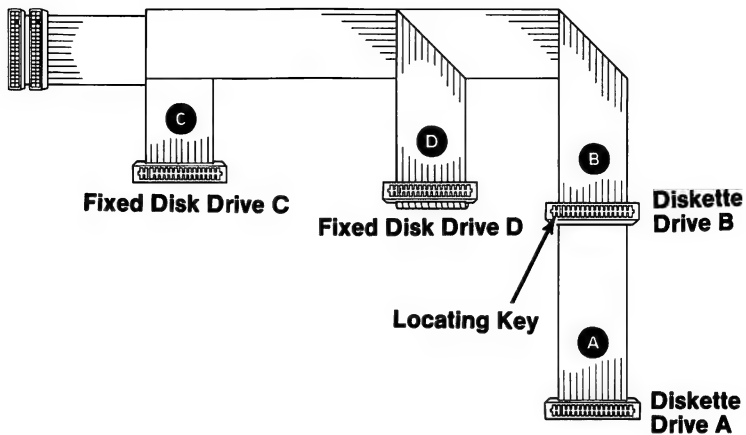


8

Slide drive B into the center slot of your system unit until it is even with drive A.

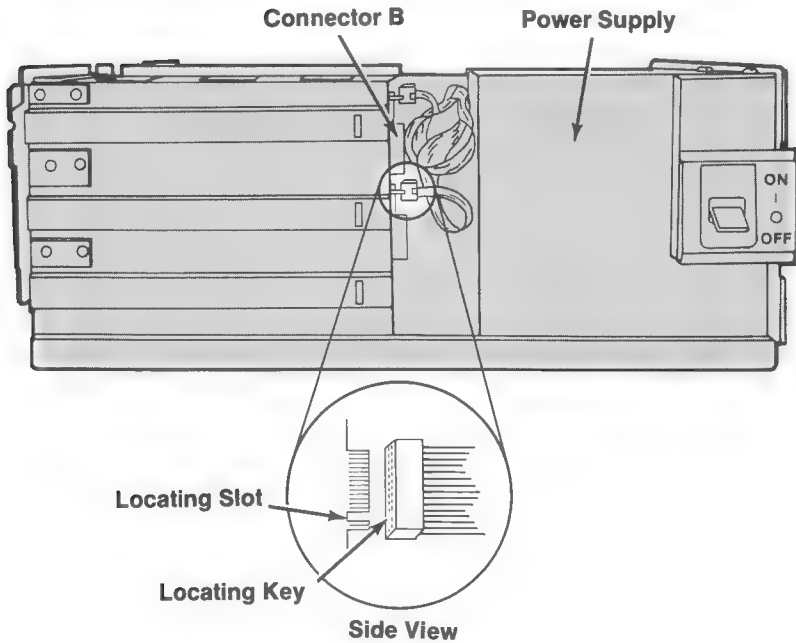


- 9 Find the connector labeled B, located behind the diskette drives.

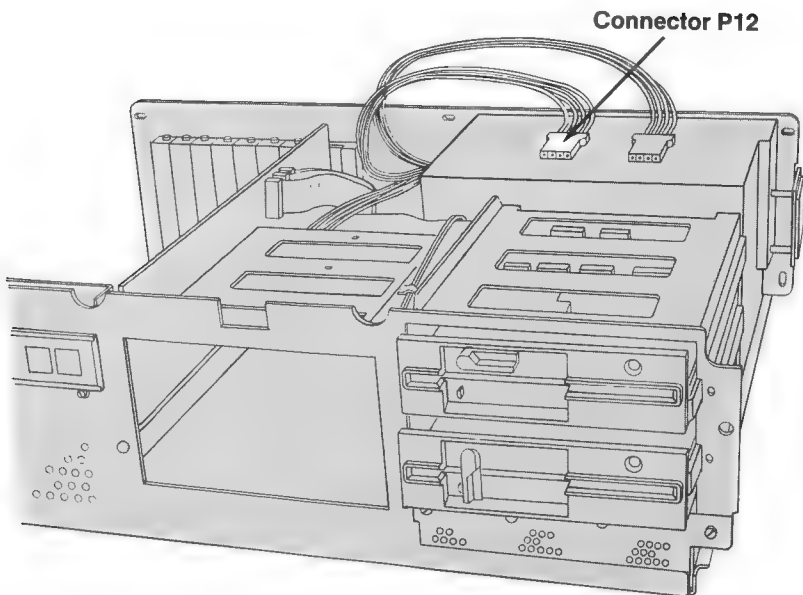


- 10 Align the locating key on connector B with the locating slot on diskette drive B, and press the connector firmly into place. Connector locations may vary.

Note: Depending on the number of drives you have installed in your system, you may have extra cable connectors.

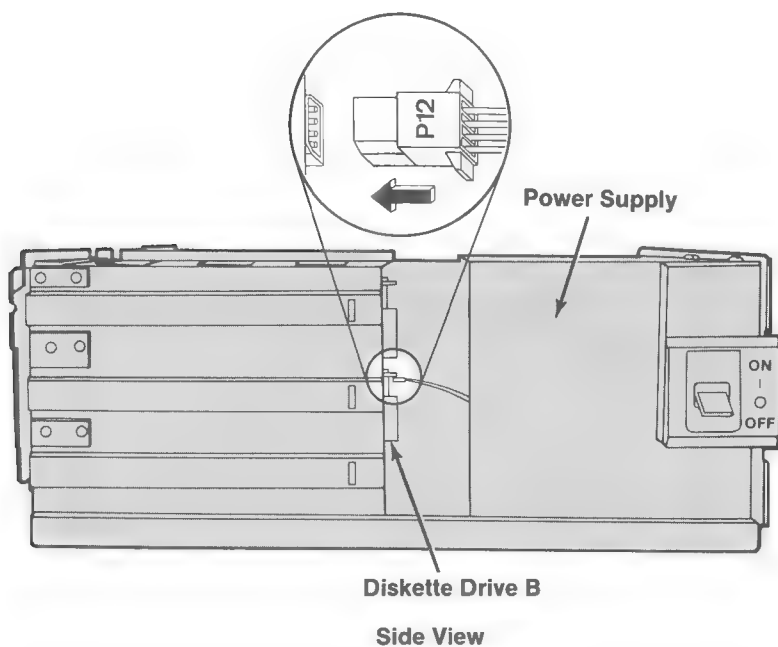


11 Find the connector labeled P12.



Front View

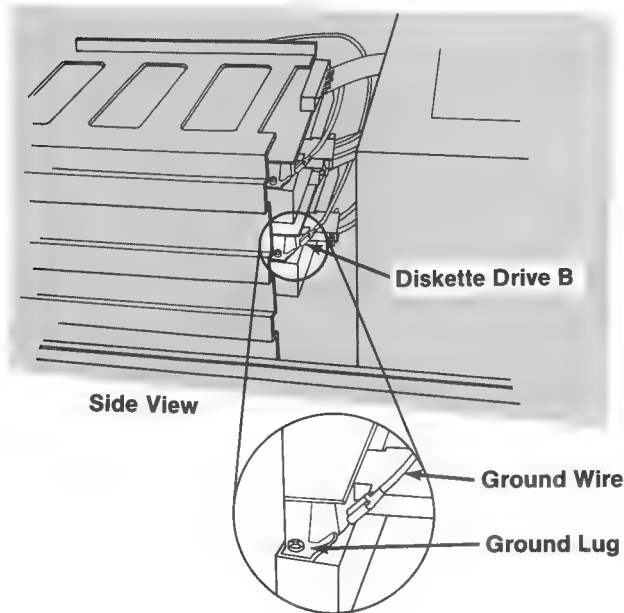
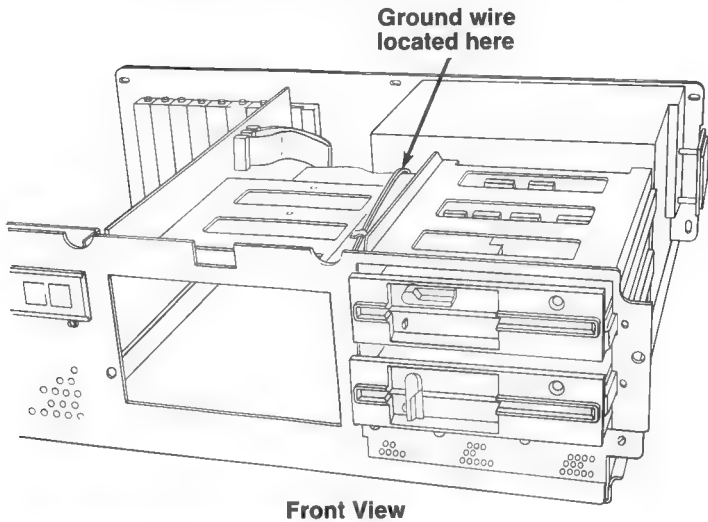
- 12 Connect the P12 connector to diskette drive B.
Connector locations may vary.



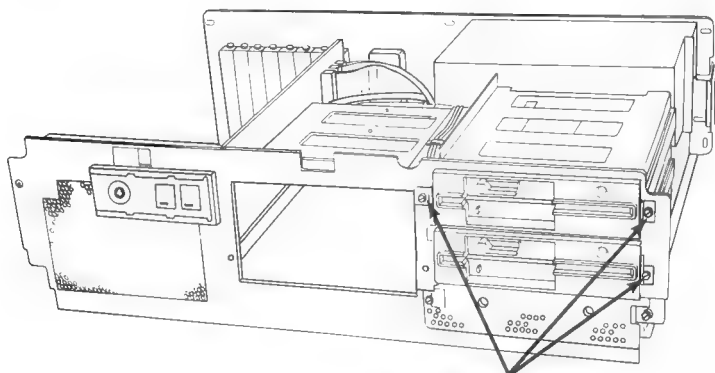
13 Connect a ground wire to diskette drive B.

Notes:

- a. You may have only one unused ground wire.
- b. The ground wire slips over the ground lug.

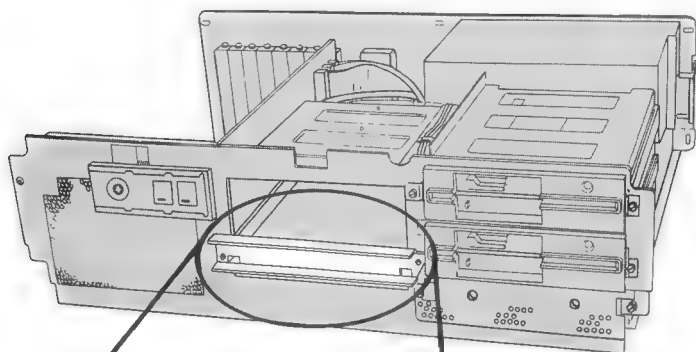


- 14** Slide diskette drives A and B into your system unit, and install the three clips and mounting screws.



**Mounting Screws
and Clips**

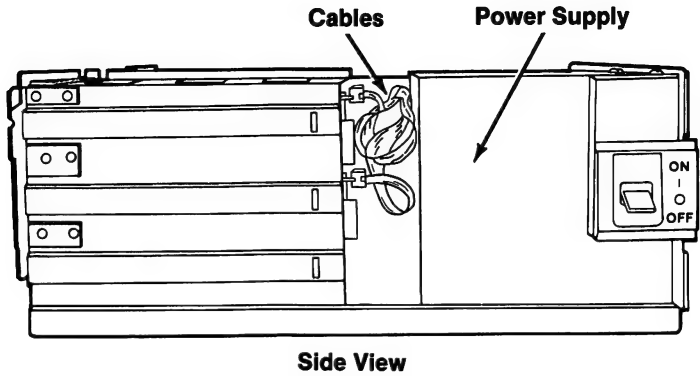
- 15** Install the keeper bracket and screws.



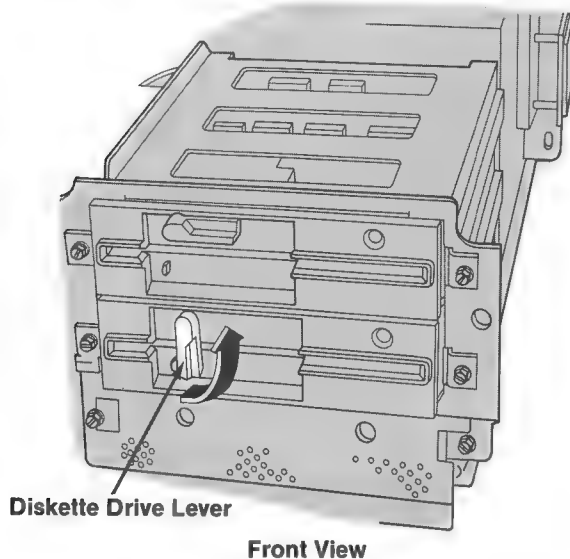
Front View

Keeper Bracket

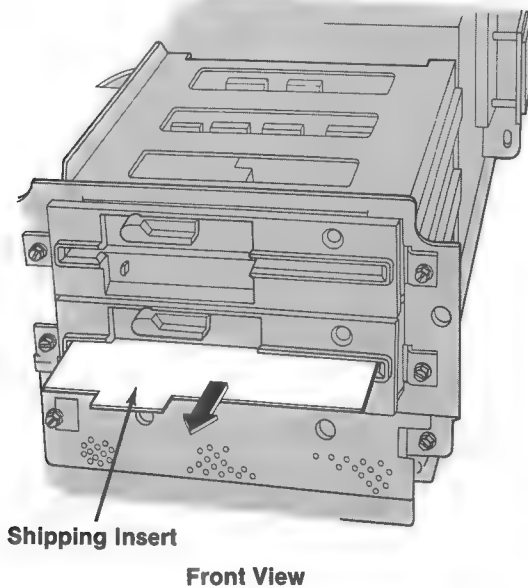
- 16** Push the cables down and out of the way. They should be no higher than the power supply.



- 17 Rotate the diskette drive lever open (counterclockwise).

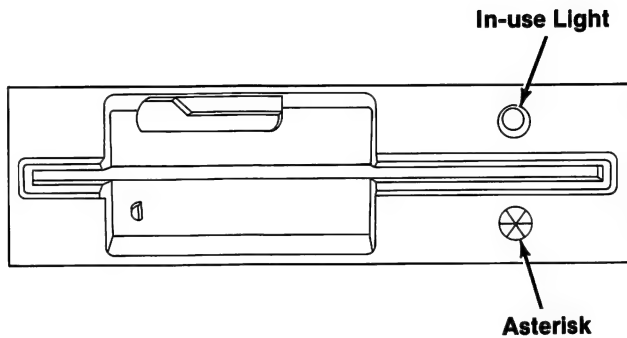


- 18 Remove the shipping insert.



19 Locate the “Setup Information” foldout in this manual and indicate the drive type for diskette drive B.

- The High Capacity Diskette (1.2 MB) drive has no special markings.
- The Double Sided Diskette (360 KB) drive is identified by a large asterisk below the in-use light.

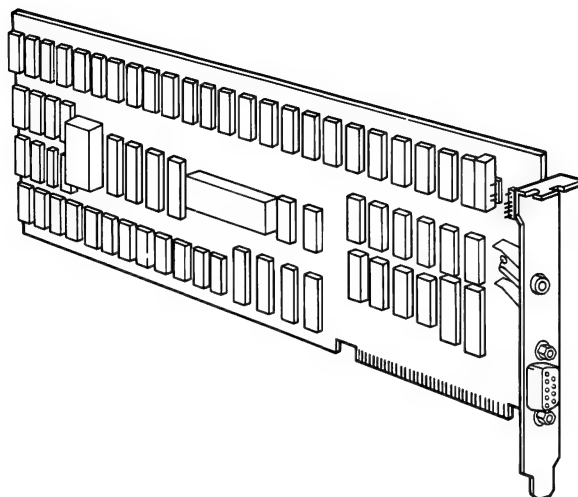


20 **IMPORTANT:** Run the Setup program on your Diagnostics diskette after all your options are installed.

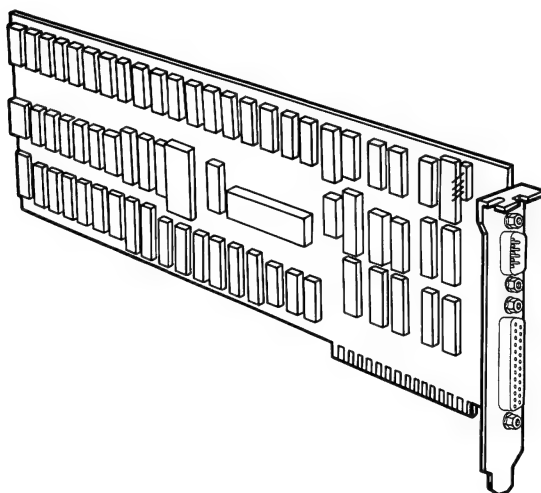
21 If you have any other internal options that need to be installed, install them now. If not, go to “Cover Installation,” page 4-76.

Display Adapter Installation

Color/Graphics Monitor Adapter



IBM Monochrome Display and Printer Adapter



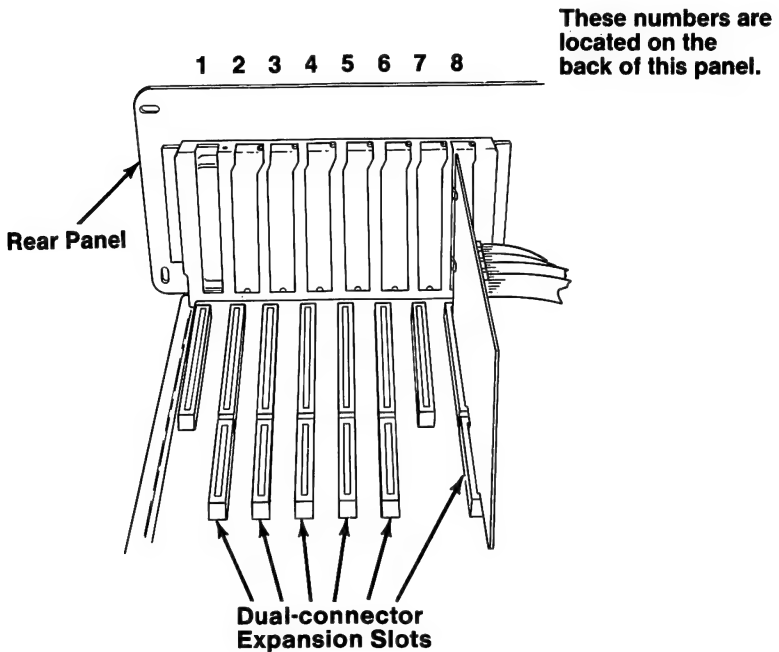
Note: If the cover is not already removed, go to “Cover Removal,” page 4-5.

Installation Requirements

If you install an IBM Monochrome Display and Printer Adapter, its printer port becomes the primary printer port.

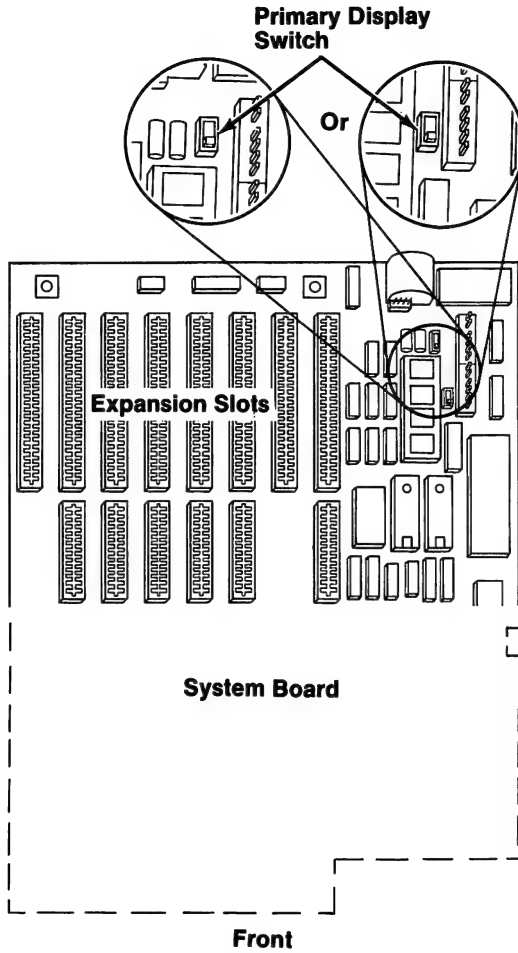
The Monochrome Display and Printer Adapter should be installed in expansion slot 6 if you are also installing the IBM Personal Computer AT Floor Stand. If you are not installing the floor stand, any available slot can be used.

The IBM Color/Graphics Monitor Adapter must be installed in expansion slot 1 or 7.



1

Locate the primary display switch on your system board. The exact location of this switch may vary slightly.



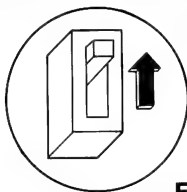
2 Is there more than one display adapter installed in your system?

YES Set the switch for the primary display (the display that you want to come on when you turn your system unit on).

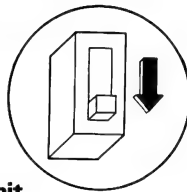
NO Set the switch for the display adapter installed in your system unit.

Note: Use a ballpoint pen to set the primary display switch if necessary.

Monochrome Display



Color Display



**Primary Display
Switch**

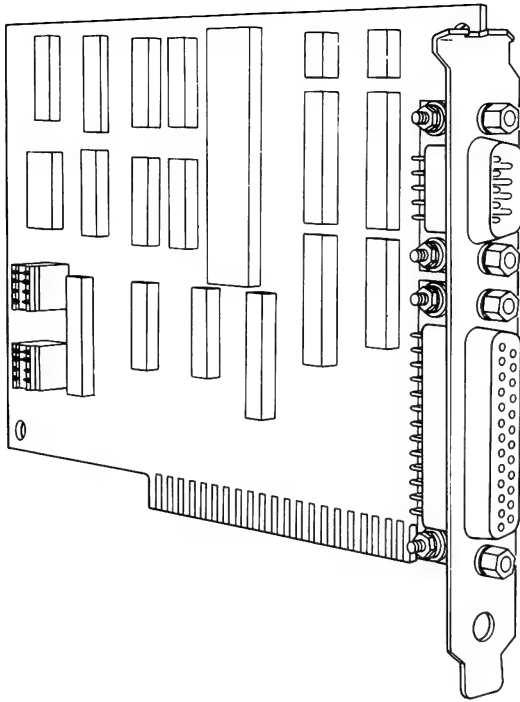
Front of System Unit

3 Locate the “Setup Information” foldout in this manual. Indicate the primary display type.

4 **IMPORTANT:** Run the Setup program on your Diagnostics diskette after all your options are installed.

5 Go to “Adapter Installation,” page 4-62.

IBM Personal Computer AT Serial/Parallel Adapter

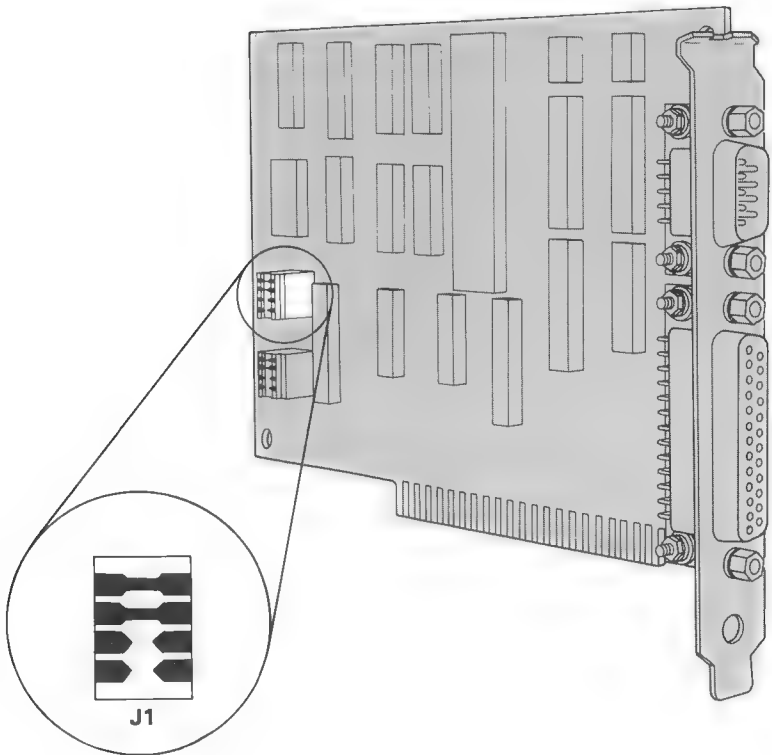


Note: If the cover is not already removed, go to “Cover Removal,” page 4-5.

The Serial Portion of the Serial/Parallel Adapter

- Your Serial/Parallel Adapter comes set to be used as serial adapter number 1. If this is your first serial adapter, no action is required.
- If this is your second serial adapter, remove module J1 and install it as shown below.

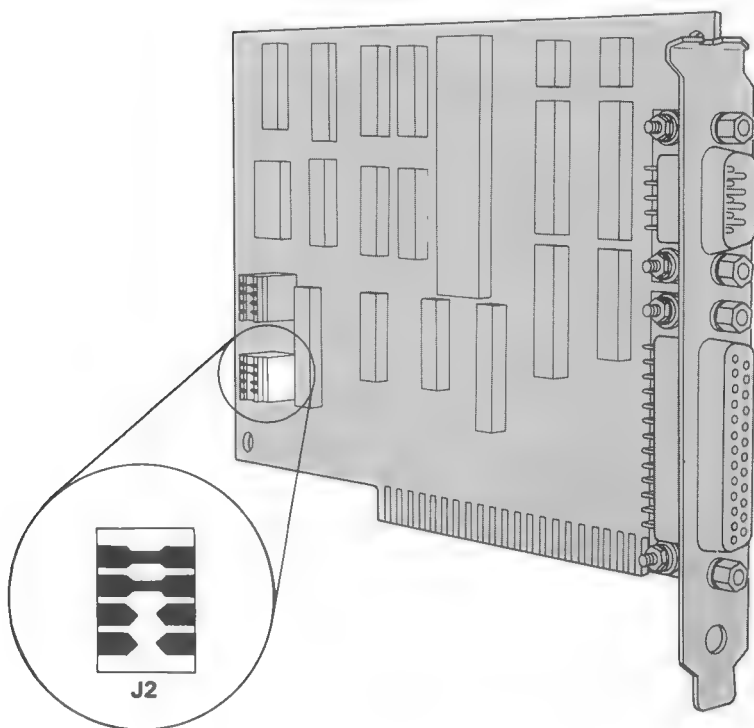
Note: To remove the module, insert a small, flat-blade screwdriver between the module and the socket and lift.



The Parallel Portion of the Serial/Parallel Adapter

- Your Serial/Parallel Adapter comes set to be used as parallel adapter number 1. If this is your first Serial/Parallel Adapter, no action is required.
- If this is your second Serial/Parallel Adapter, remove module J2 and install it as shown below.

Note: To remove the module, insert a small, flat-blade screwdriver between the module and the socket and lift.



How your system assigns parallel printer ports:

The parallel portion of the Serial/Parallel Adapter can be used as parallel adapter LPT1 (printer number 1), LPT2 (printer number 2), or LPT3 (printer number 3).

Note: When an IBM Monochrome Display and Printer Adapter and a Serial/Parallel Adapter are used in your system unit, the IBM Monochrome Display and Printer Adapter is always used by your system unit as LPT1 (printer number 1).

The following combinations show how each parallel adapter is identified by your system unit.

- One Serial/Parallel Adapter

ADAPTERS INSTALLED	LPT1	LPT2	LPT3
One Serial/Parallel Adapter	X	—	—

- Two Serial/Parallel Adapters

ADAPTERS INSTALLED	LPT1	LPT2	LPT3
1st Serial/Parallel Adapter	X	—	—
2nd Serial/Parallel Adapter	—	X	—

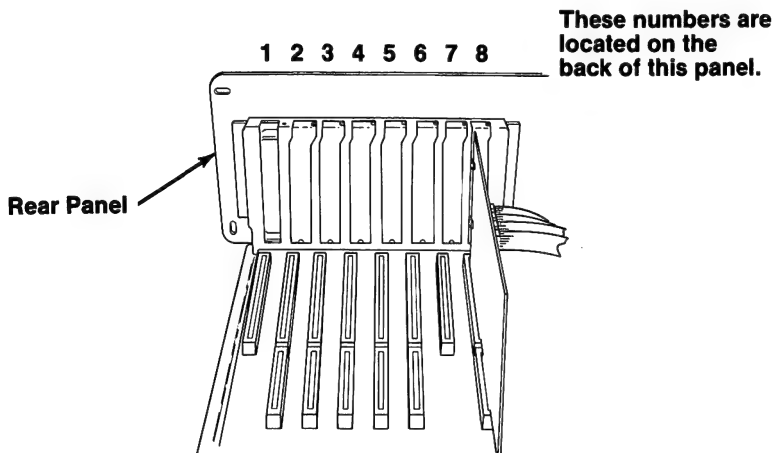
- Monochrome Display and Printer Adapter with one Serial/Parallel Adapter

ADAPTERS INSTALLED	LPT1	LPT2	LPT3
IBM Monochrome Display and Printer Adapter	X	—	—
Serial/Parallel Adapter	—	X	—

- Monochrome Display and Printer Adapter with two Serial/Parallel Adapters

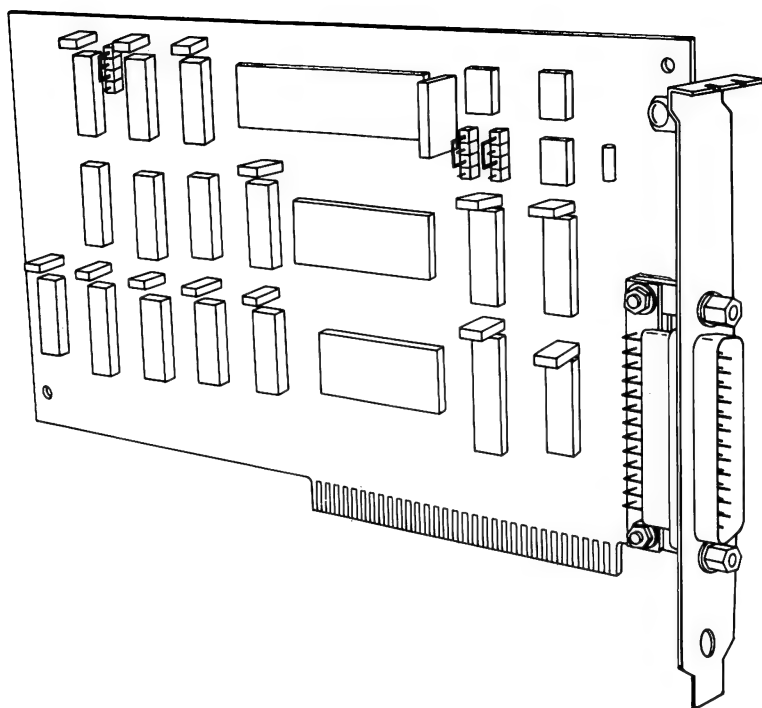
ADAPTERS INSTALLED	LPT1	LPT2	LPT3
IBM Monochrome Display and Printer Adapter	X	—	—
1st Serial/Parallel Adapter	—	X	—
2nd Serial/Parallel Adapter	—	—	X

- 1 You can install the Serial/Parallel Adapter in any available expansion slot.



- 2 Go to "Adapter Installation," page 4-62.

IBM Binary Synchronous Communications (BSC) Adapter

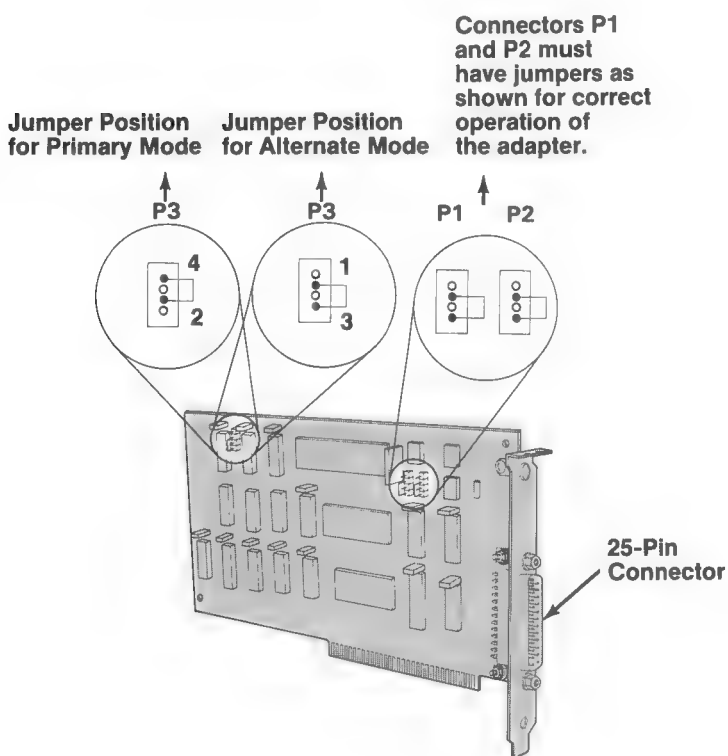


Note: If the cover is not already removed, go to "Cover Removal," page 4-5.

1 The Binary Synchronous Communications (BSC) Adapter is shown below. The primary and alternate modes are determined by the position of the jumper on connector P3.

- Installing the jumper on pins 2 and 4 selects the primary mode.
- Installing the jumper on pins 1 and 3 selects the alternate mode.

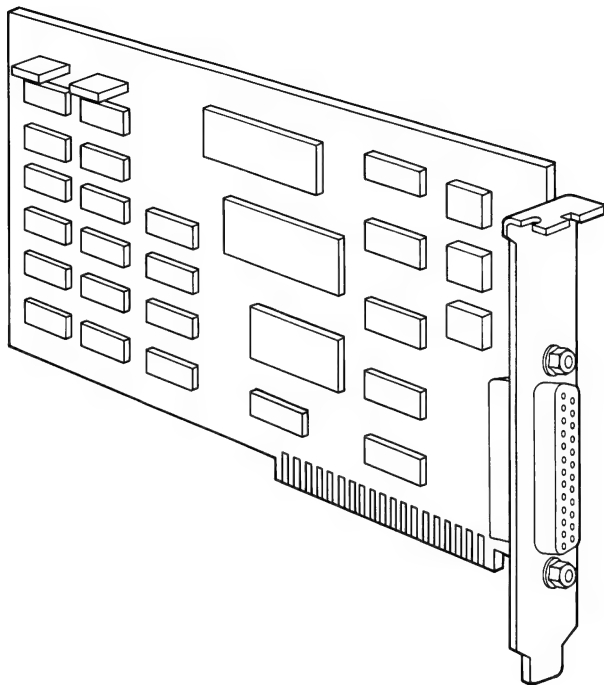
Install the jumper according to your needs.



2 You can install the Binary Synchronous Communications Adapter in any available expansion slot.

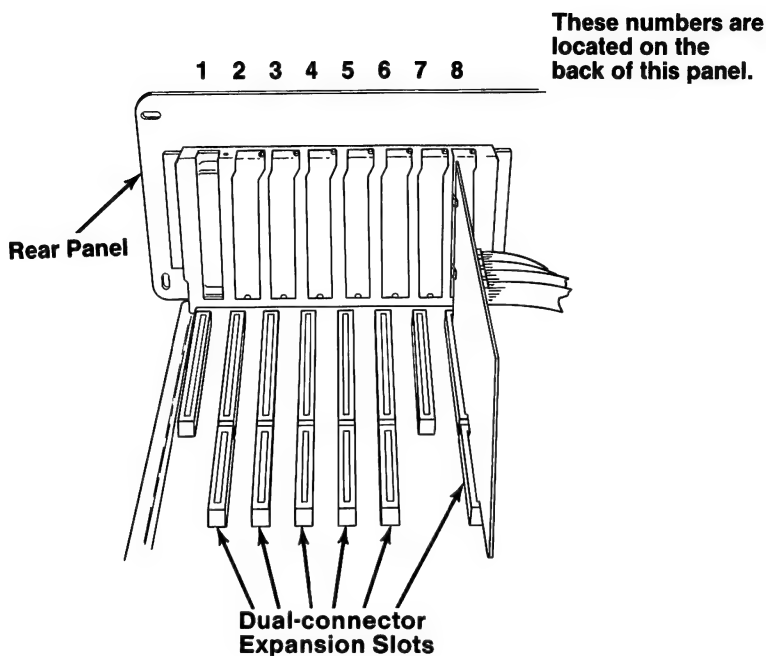
3 Go to “Adapter Installation,” page 4-62.

IBM Synchronous Data Link Control (SDLC) Communications Adapter



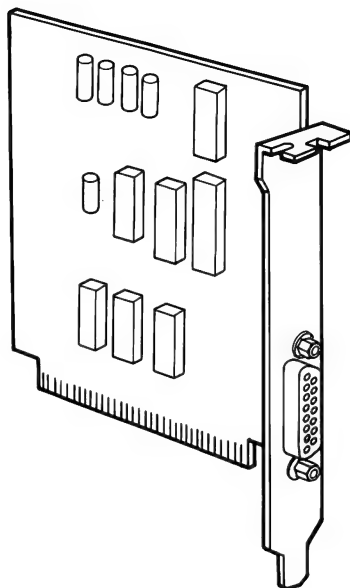
Note: If the cover is not already removed, go to "Cover Removal," page 4-5.

- 1 You can install the Synchronous Data Link Control (SDLC) Communications Adapter in any available expansion slot.



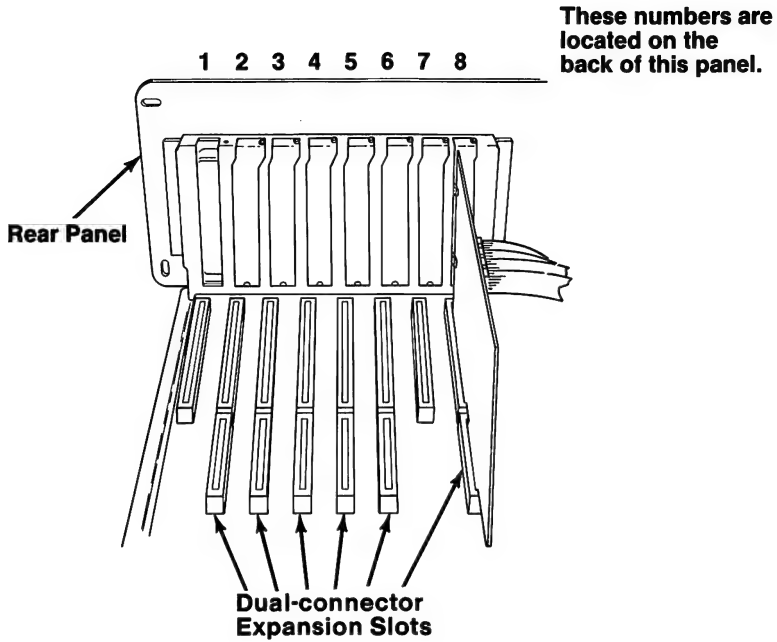
- 2 Go to "Adapter Installation," page 4-62.

IBM Game Control Adapter



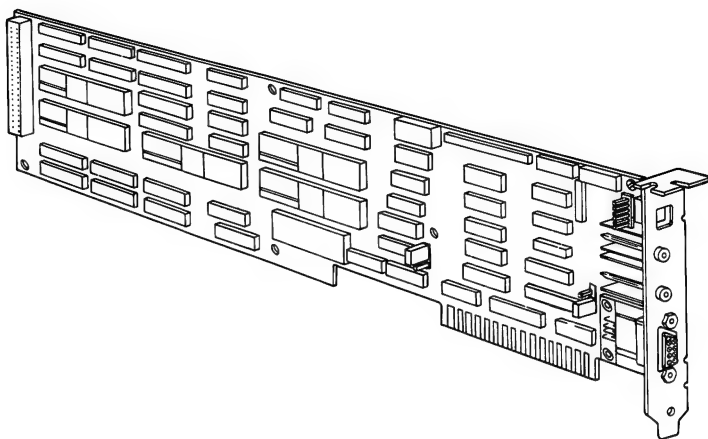
Note: If the cover is not already removed, go to "Cover Removal," page 4-5.

- 1 You can install the Game Control Adapter in any available expansion slot.



- 2 Go to "Adapter Installation," page 4-62.

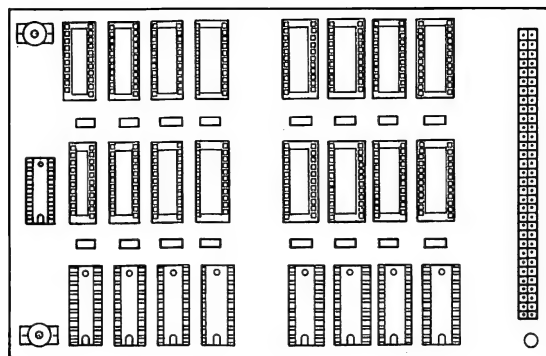
Enhanced Graphics Adapter



- 1 If the cover is not already removed, go to “Cover Removal,” page 4-5.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in this manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 2.

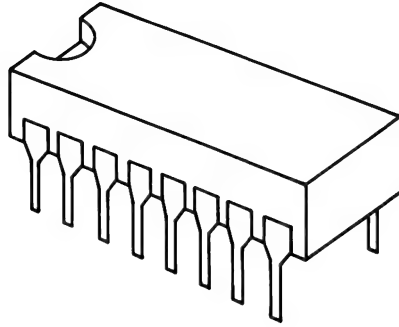
- 6 Insert the “IBM Personal Computer Enhanced Graphics Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM Personal Computer Enhanced Graphics Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-76.

Graphics Memory Expansion Card



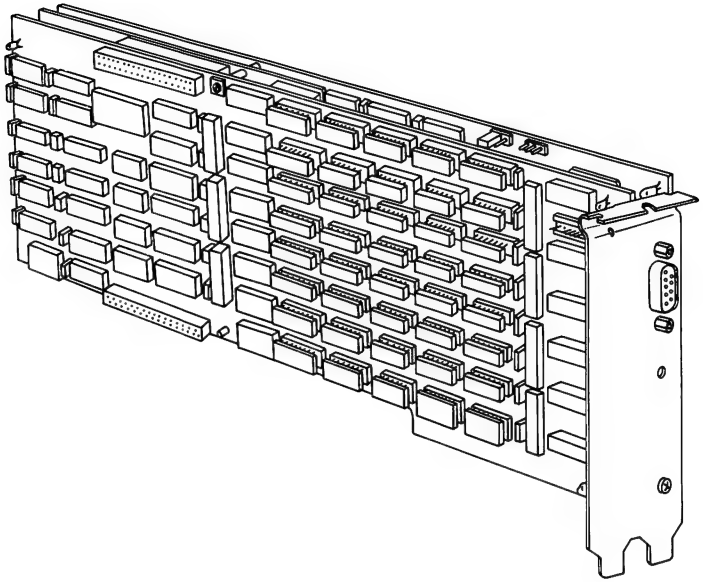
- 1 If the cover is not already removed, go to "Cover Removal," page 4-5.
- 2 Option installation instructions come with your card. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Install your expansion card as described in the installation instructions.
- 4 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-76.

Graphics Memory Module Kit



- 1 If the cover is not already removed, go to “Cover Removal,” page 4-5.
- 2 Option installation instructions come with your kit. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Install your memory module kit as described in the Kit installation instructions.
- 4 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-76.

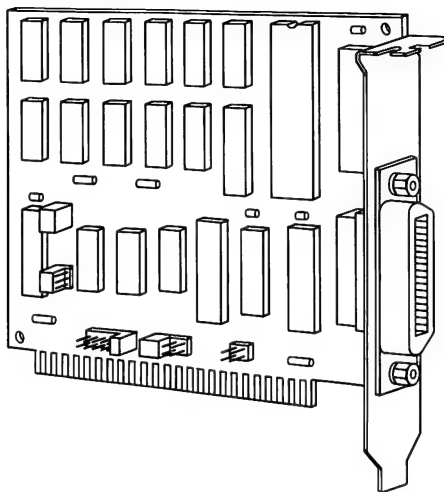
Professional Graphics Controller



- 1 If the cover is not already removed, go to "Cover Removal," page 4-5.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Discard Package 2.
- 5 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.

- 6 Discard the first page of Package 3.
- 7 Insert the "IBM Personal Computer Professional Graphics Controller Installation Instructions" after this page.
- 8 Install your controller as described in the "IBM Personal Computer Professional Graphics Controller Installation Instructions."
- 9 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-76.

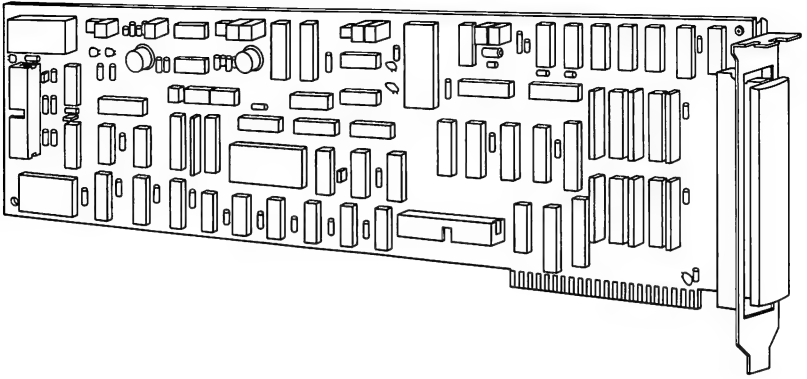
IBM Personal Computer General Purpose Interface Bus Adapter



- 1 If the cover is not already removed, go to "Cover Removal," page 4-5.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.

- 5 Discard the first page of Package 2.
- 6 Insert the "IBM Personal Computer General Purpose Interface Bus Adapter Installation Instructions" after this page.
- 7 Install your adapter as described in the "IBM Personal Computer General Purpose Interface Bus (GPIB) Adapter Installation Instructions."
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-76.

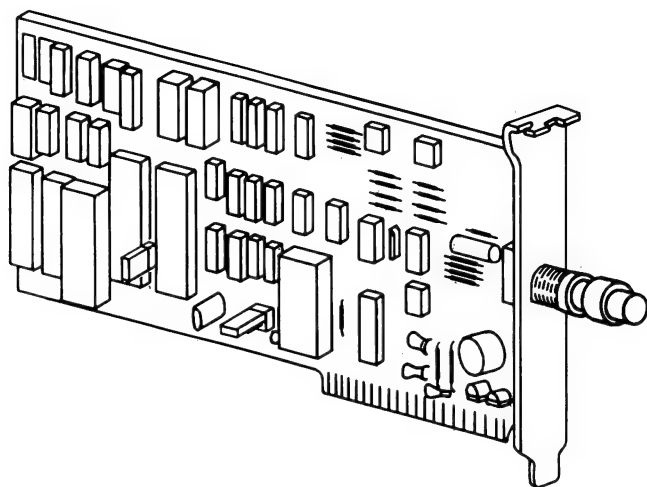
IBM Personal Computer Data Acquisition and Control Adapter



- 1 If the cover is not already removed, go to "Cover Removal," page 4-5.
- 2 Option installation instructions come with your adapter. Use the instruction package for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 2.

- 6 Insert the "IBM Personal Computer Data Acquisition and Control Adapter Installation Instructions" after this page.
- 7 Install your adapter as described in the "IBM Personal Computer Data Acquisition and Control Adapter Installation Instructions."
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-76.

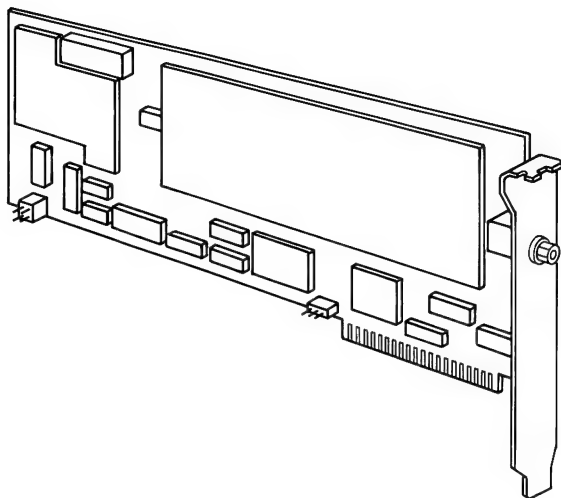
IBM PC Cluster Adapter



- 1 If the cover is not already removed, go to "Cover Removal," page 4-5.
- 2 Option installation instructions come with your adapter. Use the instruction packages for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 3.

- 6 Insert the “IBM PC Cluster Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM PC Cluster Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-76.

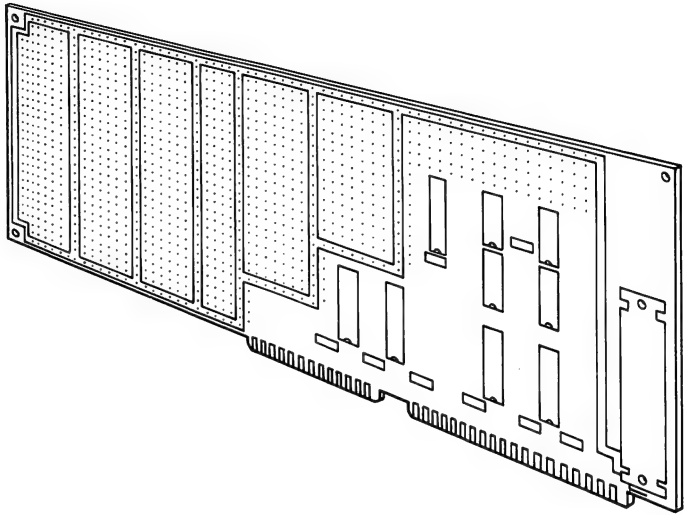
IBM PC Network Adapter



- 1 If the cover is not already removed, go to “Cover Removal,” page 4-5.
- 2 Option installation instructions come with your adapter. Use the instruction packages for the IBM Personal Computer AT to install your option.
- 3 Discard Package 1.
- 4 Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in your manual. Keep the diskette with the higher version number.
- 5 Discard the first page of Package 4.

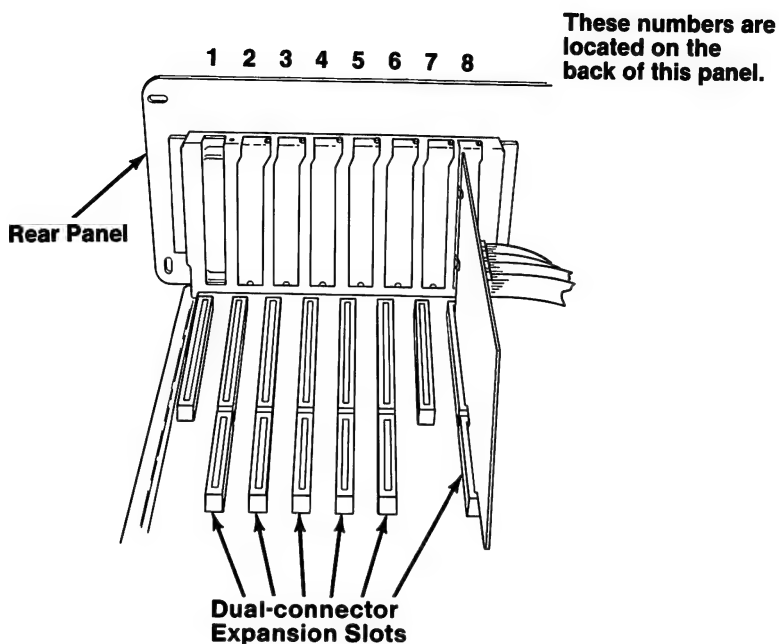
- 6 Insert the “IBM PC Network Adapter Installation Instructions” after this page.
- 7 Install your adapter as described in the “IBM PC Network Adapter Installation Instructions.”
- 8 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to “Cover Installation,” page 4-76.

IBM Personal Computer AT Prototype Adapter

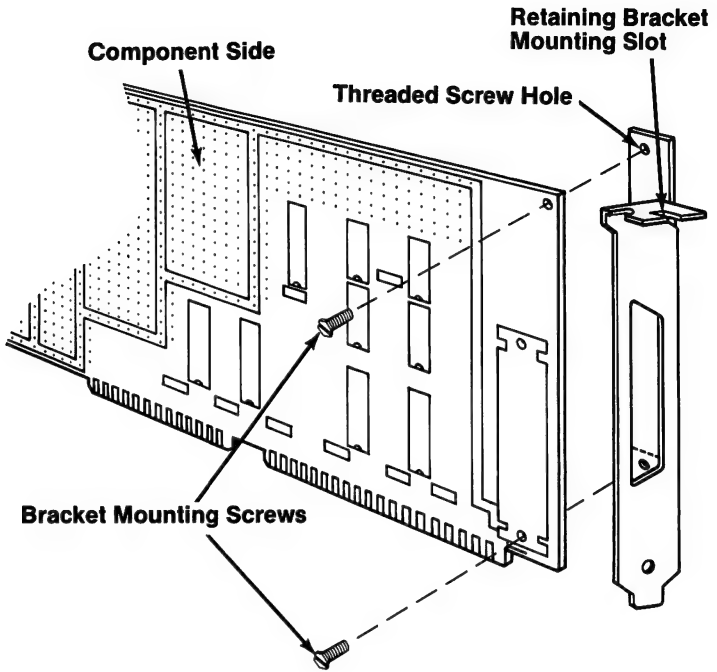


Note: If the cover is not already removed, go to "Cover Removal," page 4-5.

- 1 The IBM Personal Computer AT Prototype Adapter can be installed in any available dual-connector expansion slot.



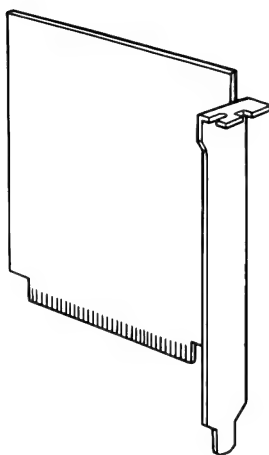
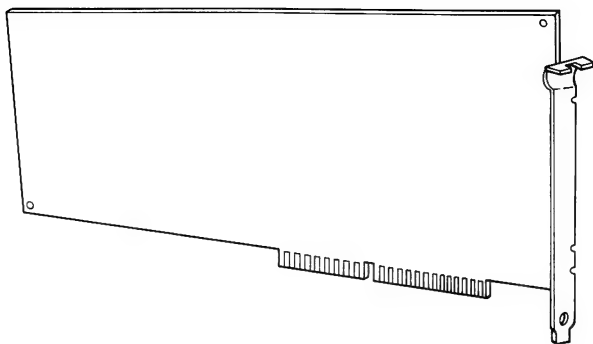
- 2 Attach the retaining bracket to the back (non-component side) of the Prototype Adapter. The retaining bracket and mounting screws are included with your adapter.



Note: As sold by IBM, this Prototype Adapter does not require certification under the FCC's rules for Class B devices. The user is responsible for any interference to radio or TV reception which may be caused by a user-modified prototype adapter.

- 3 Go to "Adapter Installation," page 4-62.

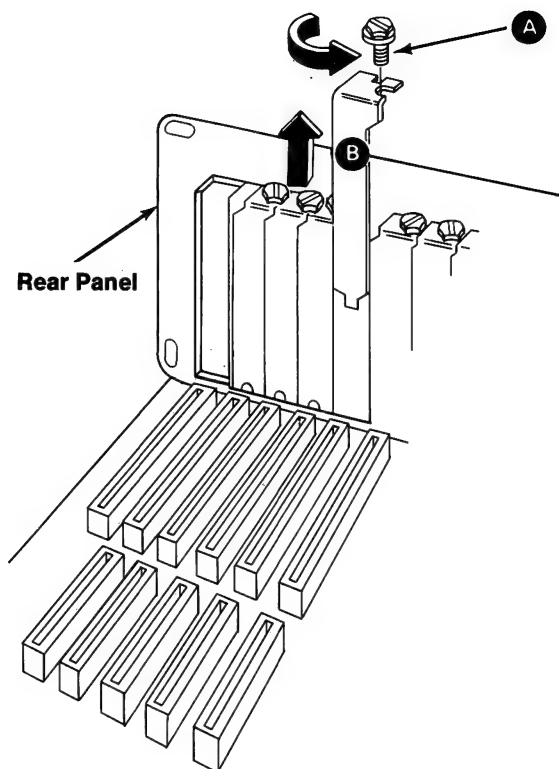
Adapter Installation



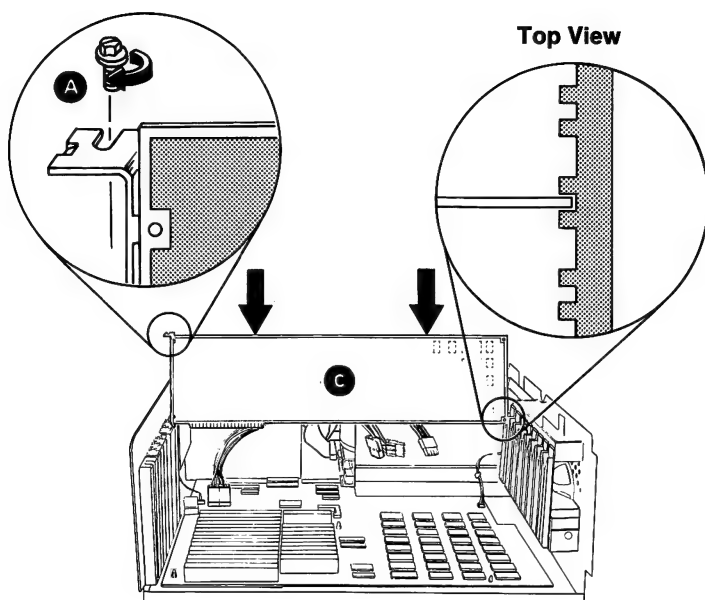
Notes:

1. Do not install the option before you read the installation procedures in this manual.
2. The table of contents gives page numbers for options listed in this manual.
3. If your option is not listed in this manual, read the installation instructions that came packaged with it.

- 1 Remove the screw **A** and expansion slot cover **B**. Save the screw and discard the expansion slot cover.



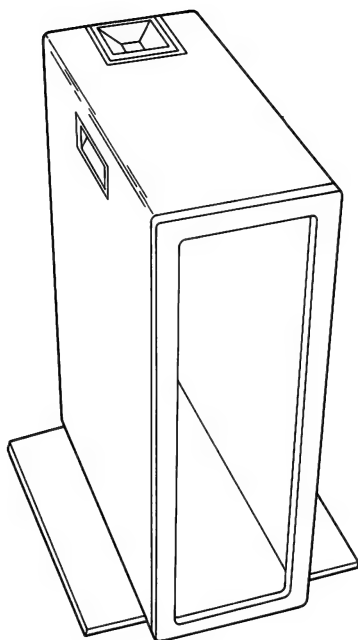
- 2 Hold the adapter **C** by the top and firmly press it into the expansion slot.



Note: Your IBM Personal Computer AT comes with support brackets installed for all expansion slots. If a support bracket came with your option, it is not needed.

- 3 Install the screw **A** you removed in Step 1.
- 4 If you have other internal options that need to be installed, continue with the installation procedures for those options. If not, go to "Cover Installation," page 4-76.

IBM Personal Computer AT Floor Standing Option



Note: If you have any internal options to install in your system, begin with “Installing Your Internal Options,” page 4-3.

Installation Requirements

The IBM Color/Graphics Monitor Adapter must be installed in expansion slot 1 or 7.

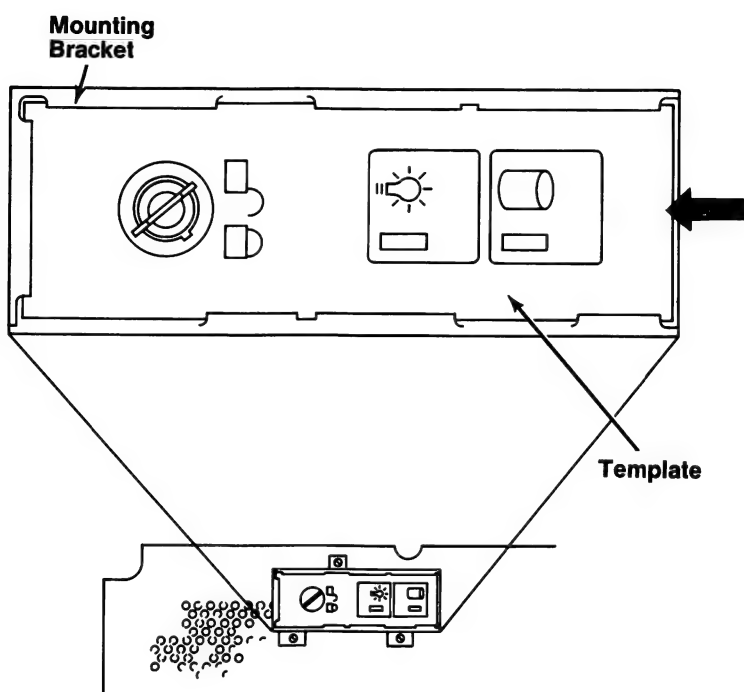
Due to the length of the signal cable on your IBM Monochrome Display, the IBM Monochrome Display and Printer Adapter should be installed in slot 7 when used with the IBM Personal Computer AT Floor Standing Option.

- Installation instructions for the Monochrome Display and Printer Adapter are located in this Section.

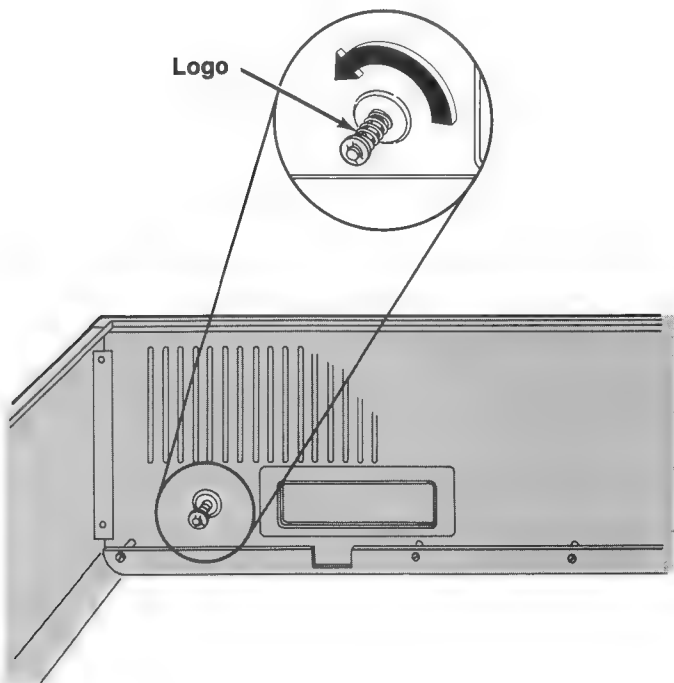
Warning: To prevent a loss of data on the fixed disk drive, back up all the files before continuing. (See your disk operating system manual for backup instructions.) When you have completed backing up your files, load your Diagnostics diskette and select option 3, "Prepare System for Moving." This will secure the heads of your fixed disk to prevent damage to the fixed disk drive during this procedure.

Note: If the cover is not already removed, go to “Cover Removal,” page 4-5.

- 1 Slide the new template into place, over the installed template.



- 2 Look inside the system unit cover and locate the back of the IBM Personal Computer AT logo. Push on the back of the logo, and turn it 90 degrees counterclockwise.



- 3 Record your system unit serial number on the "Setup Information" foldout in this manual.

CAUTION

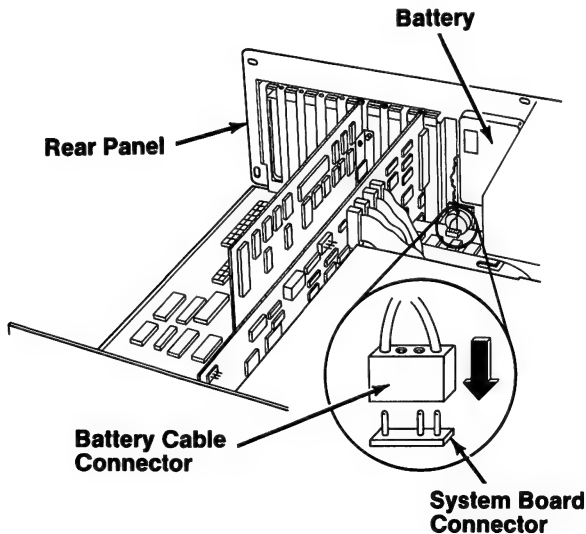
The lithium battery must be replaced with Part Number 8286121. Use of another battery could result in ignition or explosion of the battery. Replacement batteries can be ordered from an IBM authorized dealer.

CAUTION

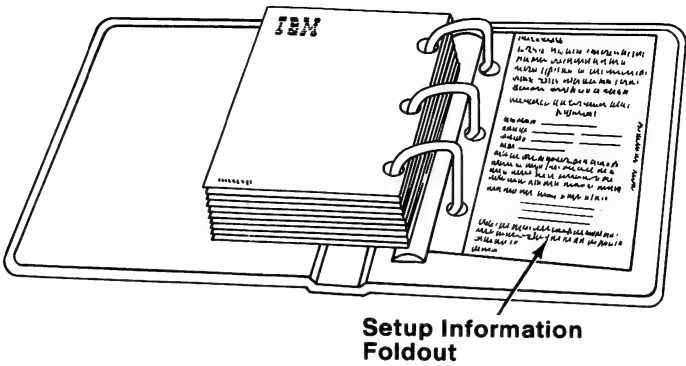
The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge, remove polarized connector, disassemble, heat above 100°C (212°F), incinerate, or expose contents to water.

- 4 Before you install the system unit cover make sure you have:

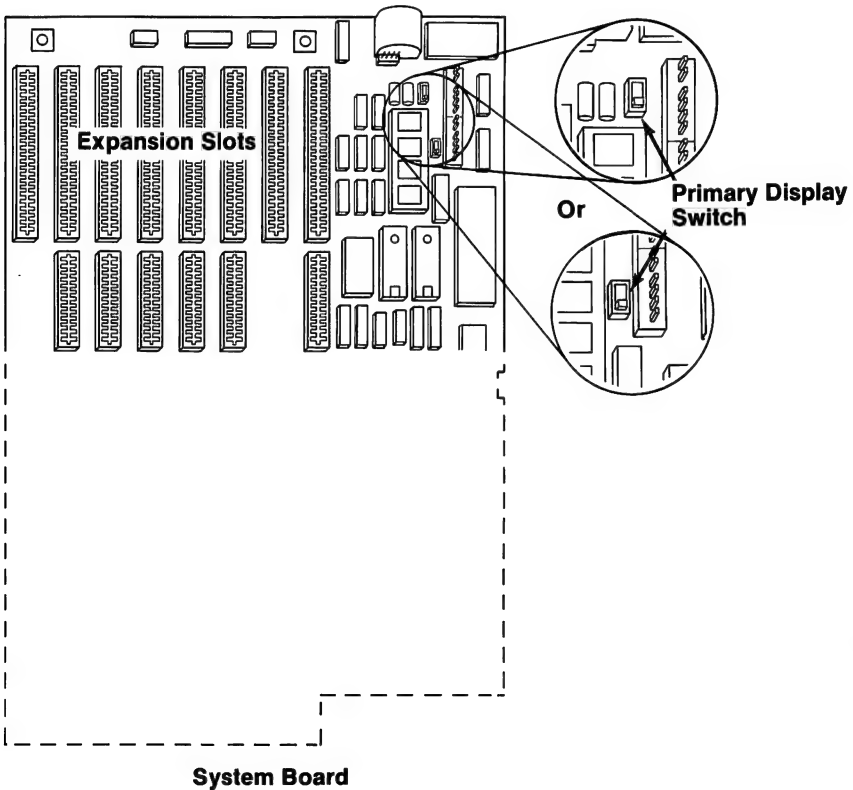
- Connected the system unit battery.



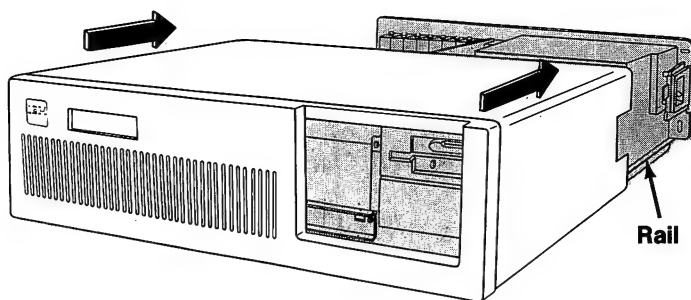
- Recorded the Setup information. (See the “Setup Information” foldout.)



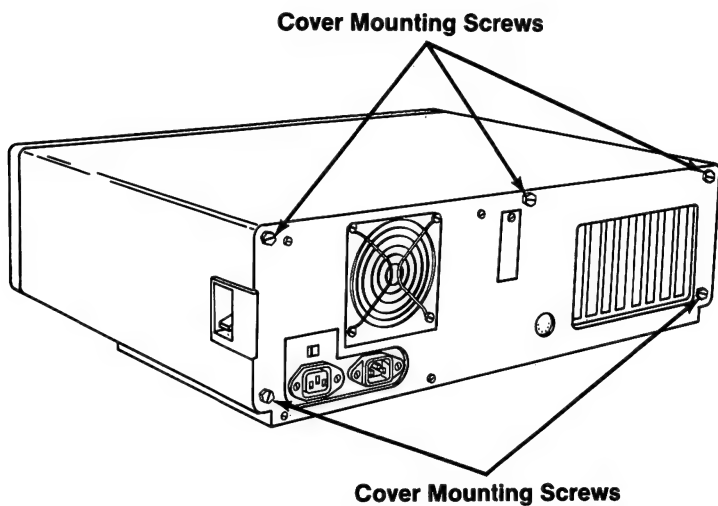
- Set the primary display switch. (See “Display Adapter Installation” in this section.)



- 5** Install the system unit cover.



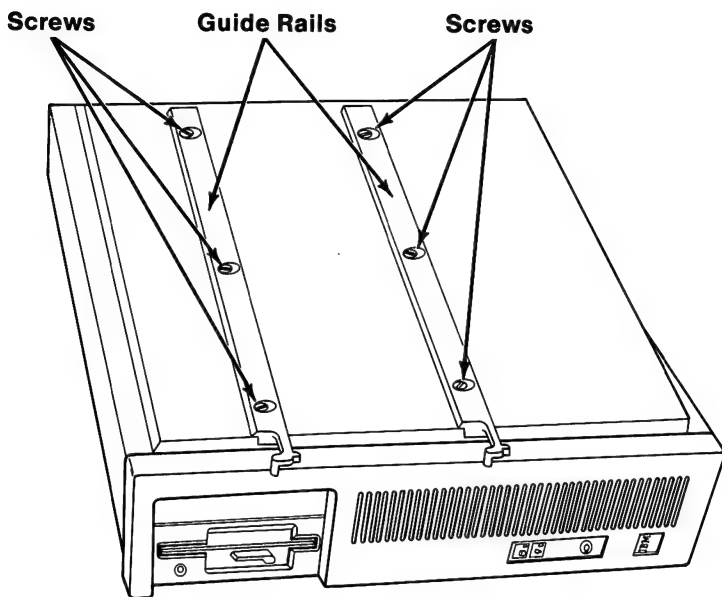
- 6** Install the cover mounting screws.



CAUTION

You may need two people to move the system unit.
It weighs approximately 23 kilograms (50 pounds).

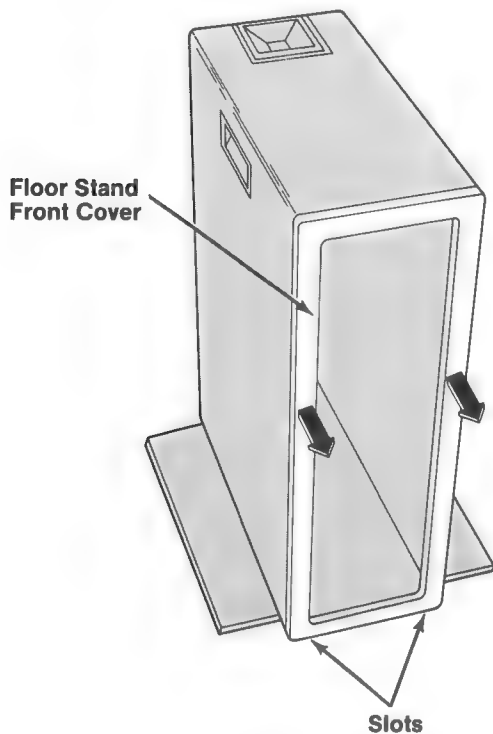
- 7 Place your system unit upside down on the work surface. Install the two guide rails on the bottom of the system unit as shown.



8

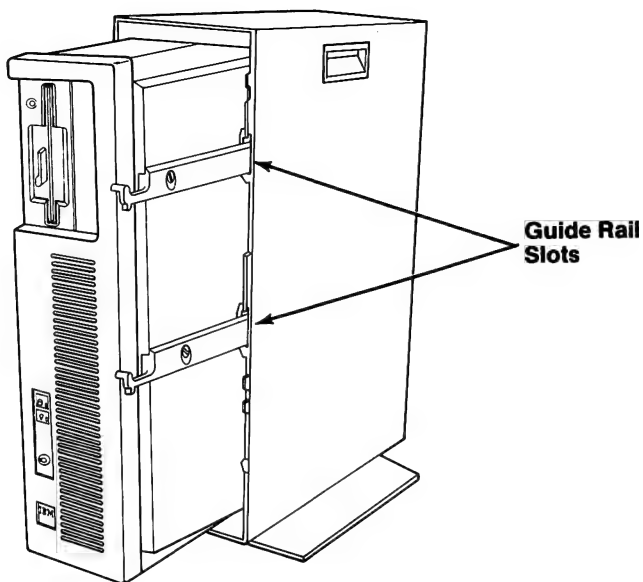
Remove the Floor Stand front cover.

- Insert a coin or a screwdriver into the slots on the bottom of the floor stand front cover.
- Gently twist the coin to release the cover.
- Pull the cover bottom out then lift up to remove it from the floor stand.

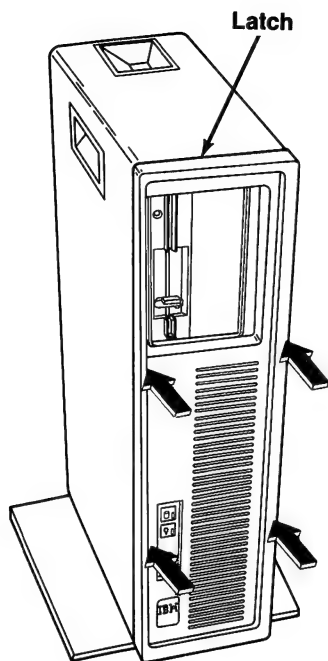


9

Align the guide rails and slots, and slide your system unit completely into the enclosure.



- 10 Set the top of the floor stand front cover on the latch of the floor stand then press the front cover into place.



- 11 Place the Floor Standing Option on the floor.
- 12 If you have options to install that attach to the outside of your system unit, continue with "External Options," page 4-79. If not, go to "System Checklist," page 2-3.

Cover Installation

IMPORTANT: Before you install the system unit cover make sure you have:

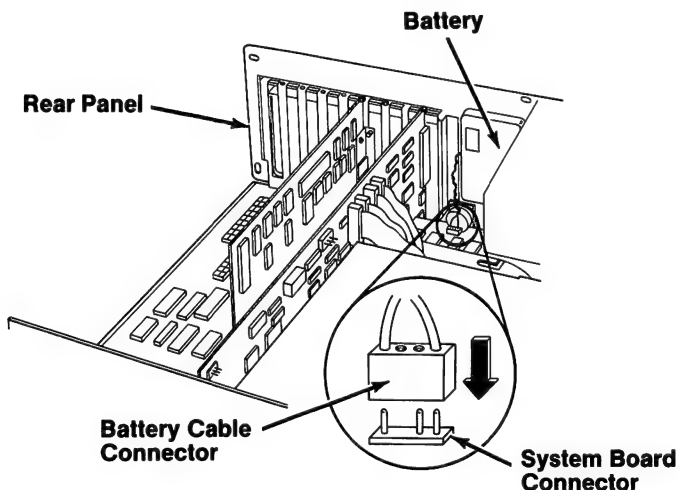
CAUTION

The lithium battery must be replaced with Part Number 8286121. Use of another battery could result in ignition or explosion of the battery. Replacement batteries can be ordered from an IBM authorized dealer.

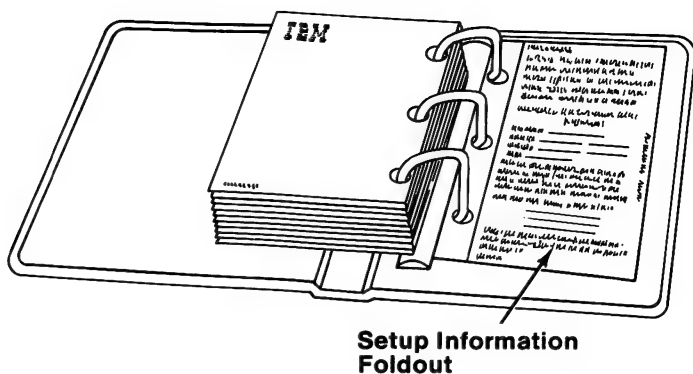
CAUTION

The lithium battery presents a fire, explosion, or severe burn risk. Do not recharge, remove polarized connector, disassemble, heat above 100°C (212°F), incinerate, or expose contents to water.

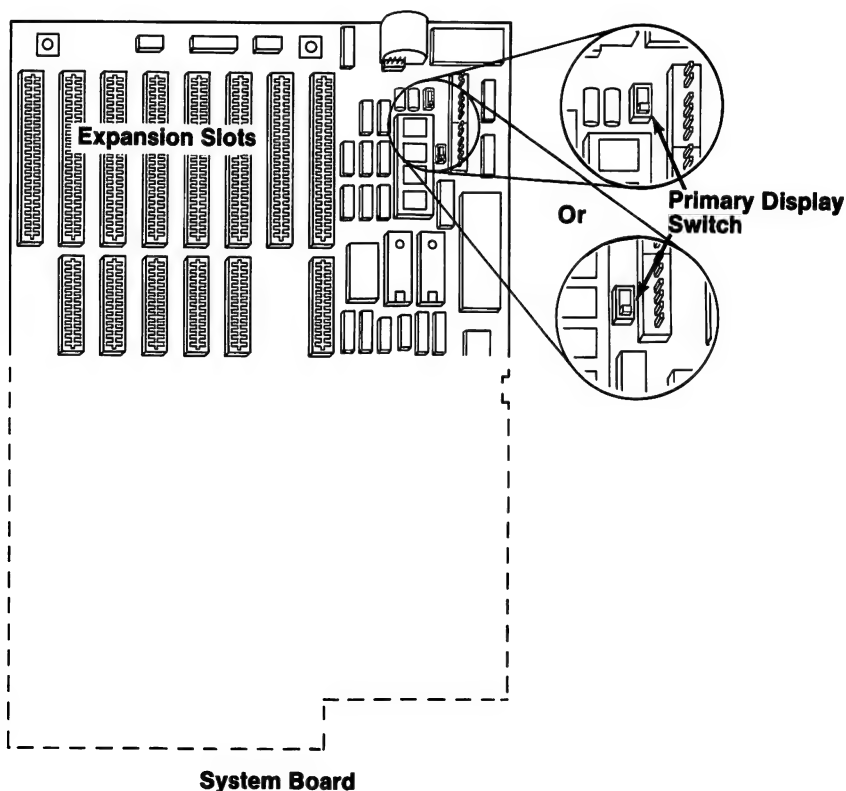
- Connected the system unit battery.



- Recorded the Setup information. (See the “Setup Information” foldout.)

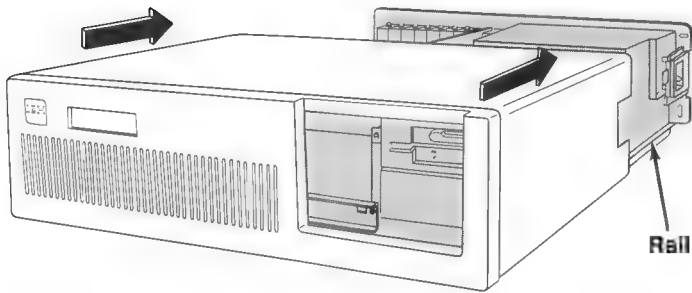


- Set the primary display switch. (See “Display Adapter Installation” in this section.)

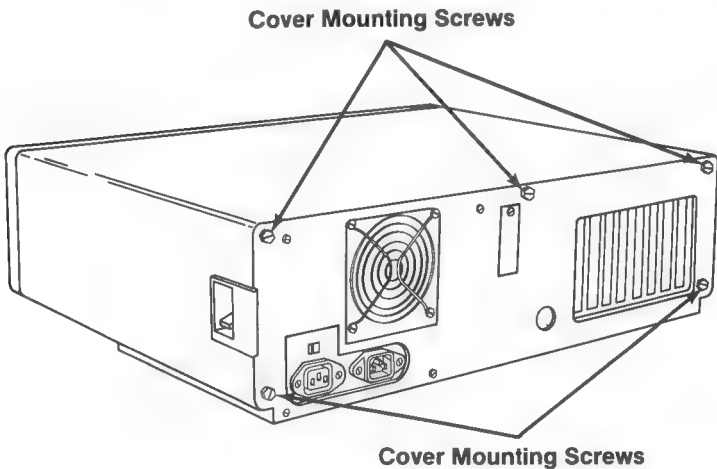


1 Install the system unit cover.

- Make sure the cover is under the rail on the frame.
- Lift the cover up against the rail and slide it onto your system unit.



2 Install the cover mounting screws.



3 If you have options to install that attach to the outside of your system unit, continue with "External Options," page 4-79. If not, go to "System Checklist," page 2-3.

External Options

External options attach to the *outside* of your IBM Personal Computer AT. Some of the external options available for your system are listed below:

- Displays
- Printer or communication devices
- Cables.

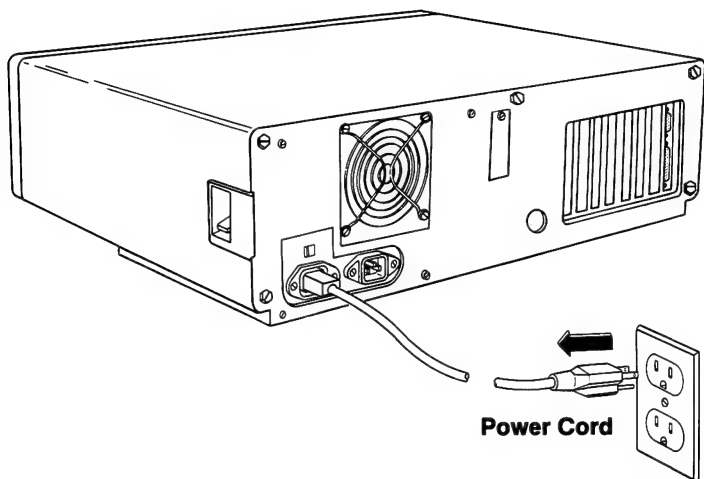
Use the procedures in this section along with the installation instructions that come with your option. Refer to this section's table of contents for specific page numbers. Install external options in any order that is convenient for you.

Note: When separate operating instructions come with your options, you may file them in this manual.

Required Tools

- Medium-size, flat-blade screwdriver
- Medium-size, Phillips screwdriver (printers only).

- 1 Turn off your system unit.
- 2 Turn off all external options (printer, display and others).
- 3 Unplug power cords (system, printer, display and others) from electrical outlets.

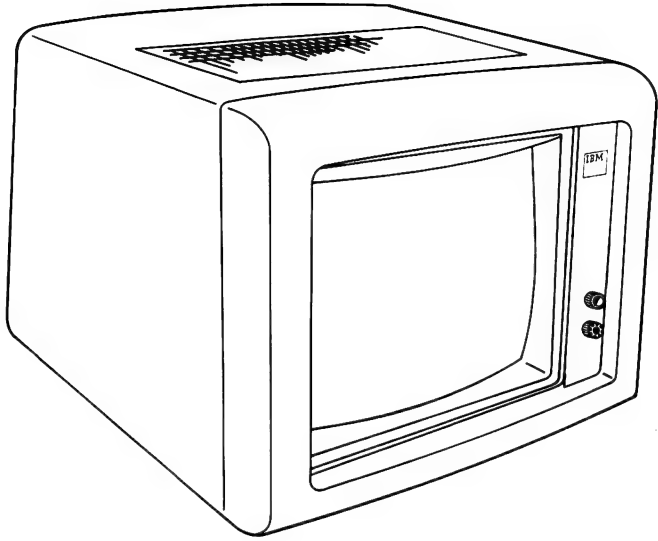


- 4 Continue with the instructions for the option that you are installing.

Notes:

- a. This section's table of contents lists page numbers for options listed in this manual.
- b. If your option is not listed in this manual, use the installation instructions that came packaged with it.

IBM Monochrome Display



Installation Requirements

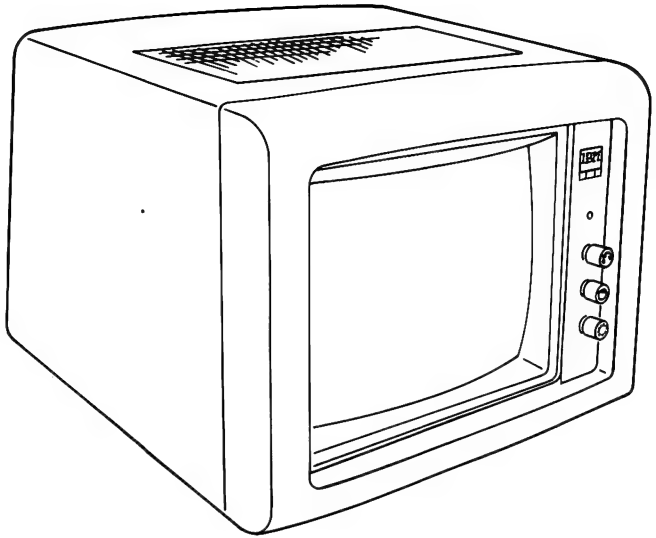
The monochrome display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

DANGER

Serious shock hazards exist within the covers of the IBM Monochrome Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

- 1 Installation instructions come with your display.
- 2 Insert the Limited Warranty and Cabling Instructions after this page.
- 3 Record the display serial number on the "Setup Information" foldout in this manual.
- 4 Use the Cabling Instructions to connect the IBM Monochrome Display to your IBM Personal Computer AT.
- 5 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3.

IBM Color Display



Installation Requirements

The color display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

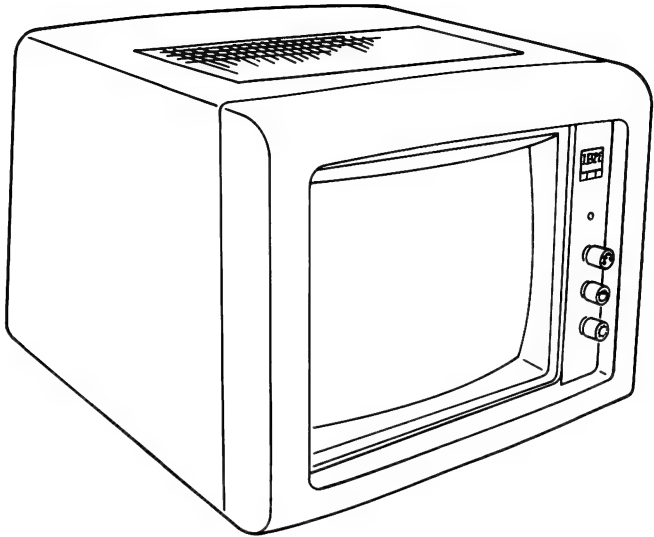
DANGER

Serious shock hazards exist within the covers of the IBM Color Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

- 1 Installation instructions come with your display.
- 2 Discard the update pages for Problem Determination Procedures.
- 3 Insert the Limited Warranty and the Installation and Operating instructions after this page.
- 4 Install your IBM Color Display following the "Installation and Operating" instructions.
- 5 Locate the "Setup Information" foldout in this manual and indicate the display mode.
 - 40-column mode allows 40 large characters across the screen.
 - 80-column mode allows 80 smaller characters across the screen.

Note: Some programs (such as "Exploring The IBM Personal Computer AT") will run only in the 80 column mode. You can change the mode by using the Setup program on your Diagnostics diskette. For more information refer to "Setup Program" in Section 2.
- 6 Record the display serial number on the "Setup Information" foldout in this manual.
- 7 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3.

IBM Enhanced Color Display



Installation Requirements

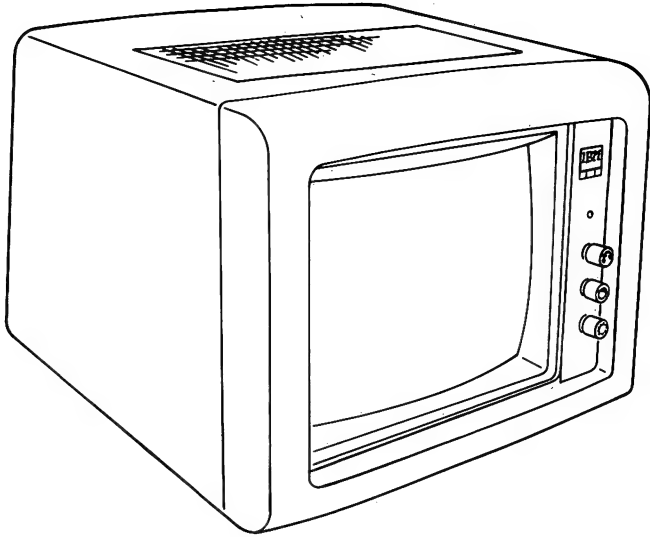
The display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

DANGER

Serious shock hazards exist within the covers of the IBM Enhanced Color Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

- 1 Installation instructions come with your display. Use the instruction package for the IBM Personal Computer AT to install your option.
- 2 Discard Package 1.
- 3 Discard Package 2.
- 4 Discard the first page of Package 3.
- 5 Insert the "IBM Enhanced Color Display Operating Instructions" after this page.
- 6 Discard the first page of Package 4.
- 7 Insert the "IBM Enhanced Color Display Installation Instructions" after this page.
- 8 Install your display as described in the "IBM Enhanced Color Display Installation Instructions."
- 9 Record the display serial number on the "Setup Information" foldout in this manual.
- 10 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3.

IBM Professional Graphics Display






Installation Requirements

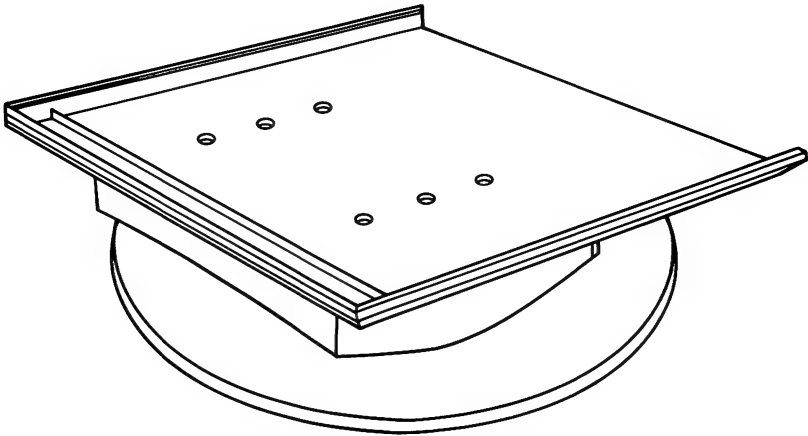
The display adapter to which you are connecting this option should already be installed in your system. If not, refer to the option instructions for the display adapter. Install the display adapter before continuing.

DANGER

Serious shock hazards exist within the covers of the IBM Personal Computer Professional Graphics Display. Do not open these covers under any circumstances. There are no user-serviceable parts inside.

- 1 Installation instructions come with your display. Use the instruction package for the IBM Personal Computer AT to install your option.
- 2 Discard the first page of Package 1. 
- 3 Discard "Operating Your Display" (pages 1-135 and 1-136).
- 4 Insert the "IBM Personal Computer Professional Graphics Display Installation and Operating Instructions" after this page.
- 5 Install your display as described in the "IBM Personal Computer Professional Graphics Display Installation and Operating Instructions."
- 6 Record the display serial number on the "Setup Information" foldout in this manual. 
- 7 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3. 

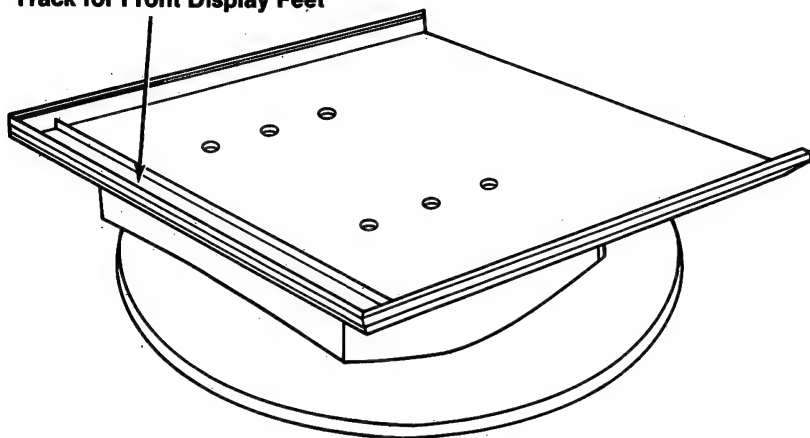
IBM Personal Computer Display Stand



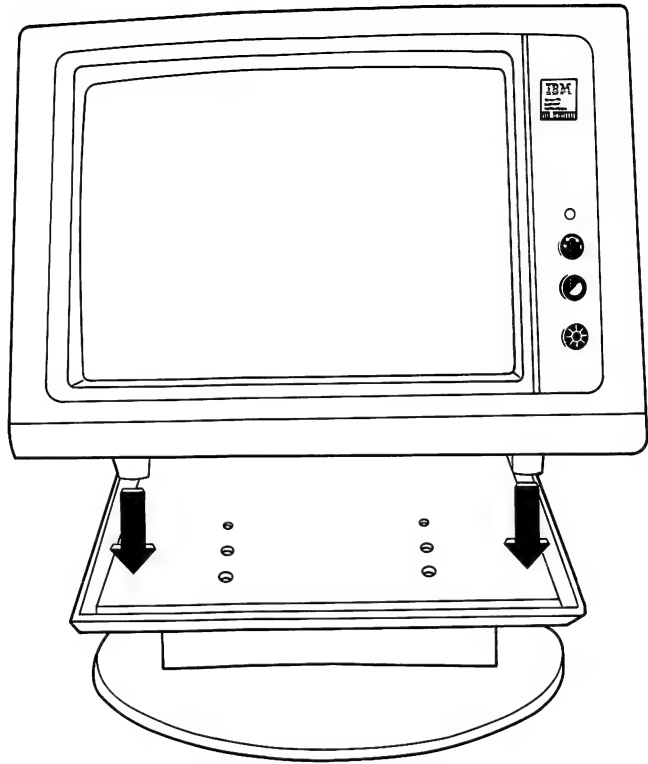
- 1 Place the display stand so the front track faces you.

Note: You may find it easier to position your display on the stand with the display cables disconnected.

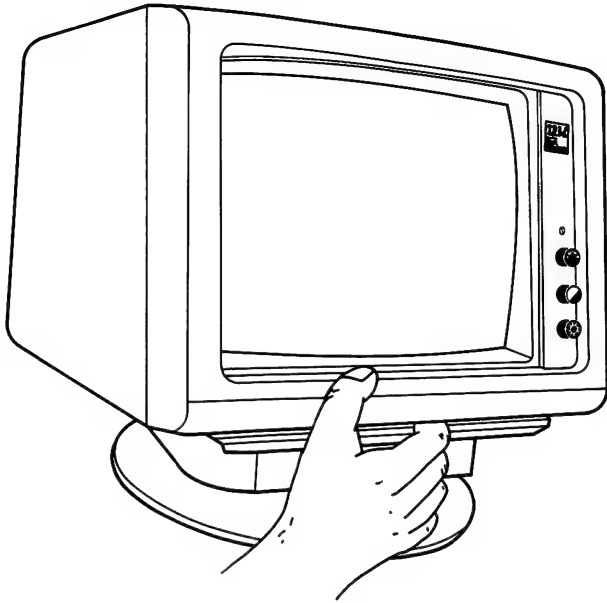
Track for Front Display Feet



- 2 Lift and gently place the front feet of your display in the track of the display stand.

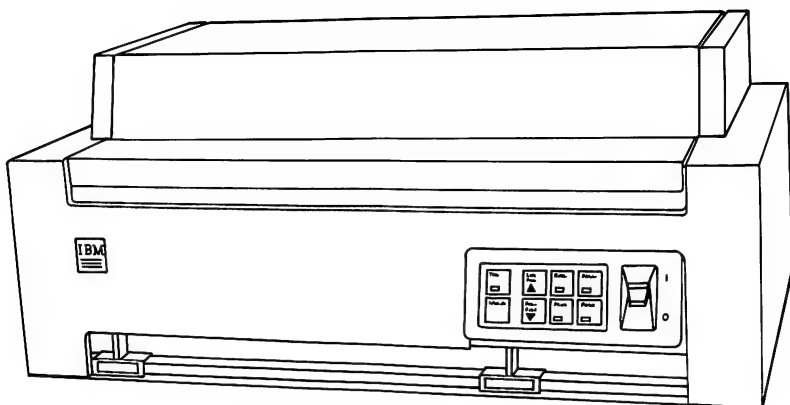


- 3** You can now adjust your display by pivoting the stand up or down and by rotating it.



- 4** If you have any other external options that need to be installed, continue with the installation procedures for those options. If not, go to “System Checklist,” page 2-3.

IBM Personal Computer Color Printer



Installation Requirements

The adapter to which you are connecting this printer should already be installed in your system. If not, refer to the option instructions for the adapter, and install it before continuing.

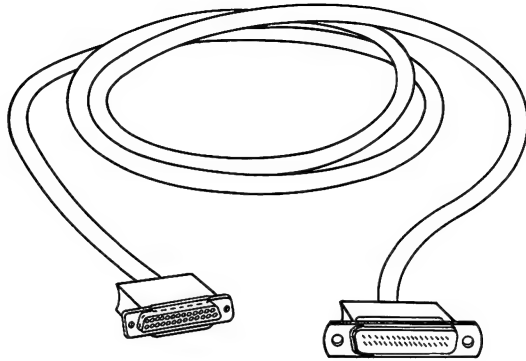
DANGER

Serious shock hazards exist within the covers of the IBM Personal Computer Color Printer. Do not remove these covers under any circumstances. There are no user-serviceable parts inside.

Warning: Do not connect your printer to an electrical outlet or to your system unit until you have completed the unpacking instructions. You could damage your printer.

- 1 Follow the instructions printed on the shipping carton to remove your printer from the carton.
- 2 Installation instructions come with your printer.
- 3 Discard the cover sheet.
- 4 Discard the "Problem Determination Procedures." They are not for your system.
- 5 Discard the Diagnostics diskette that came with the IBM Personal Computer Color Printer. It is not for your system.
- 6 Insert the "IBM Personal Computer Color Printer Installation and Operation Instructions" after this page.
- 7 Use the "IBM Personal Computer Color Printer Installation and Operating Instructions" to install, and operate your color printer.
- 8 Record the serial number on the "Setup Information" foldout in this manual.
- 9 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3.

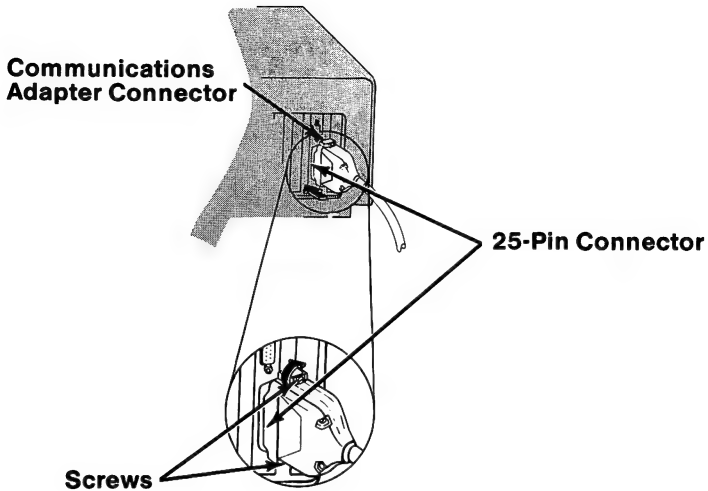
IBM Communications Cable



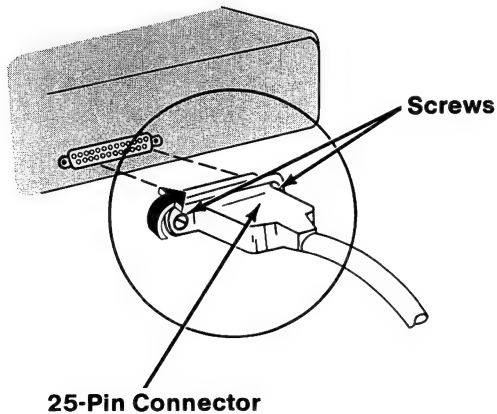
Installation Requirements

The communications adapter to which you are connecting this cable should already be installed in your system. If not, refer to the option instructions for the communications adapter, and install it before continuing.

- 1 Connect the communications adapter cable to the communications adapter connector.

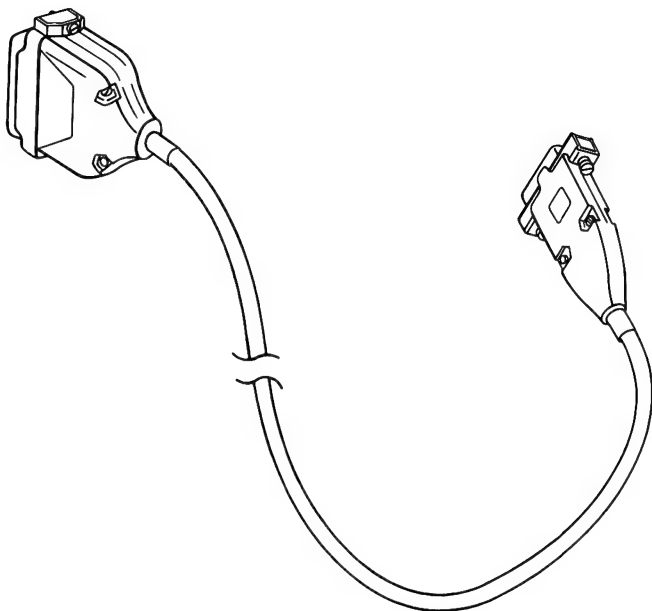


- 2 Connect the other end of the cable to the modem or any other RS-232C data communications equipment.



- 3 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3.

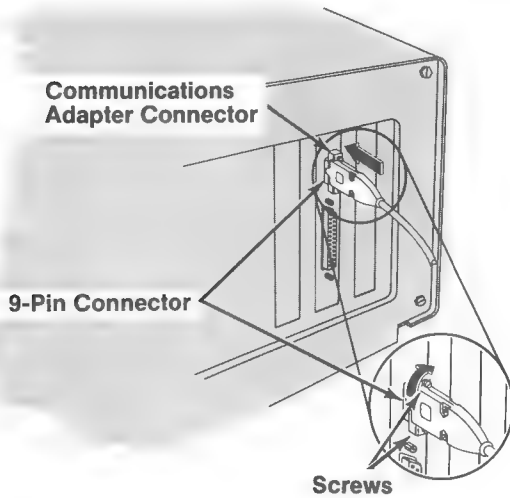
IBM Personal Computer AT Serial Adapter Cable



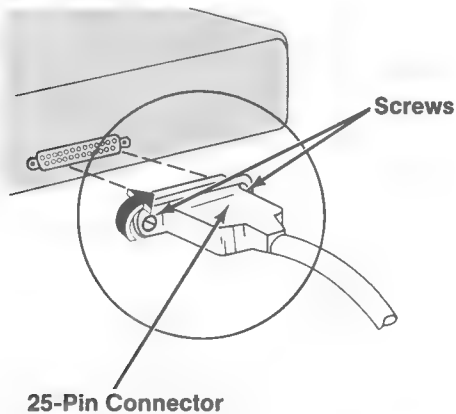
Installation Requirements

The communications adapter to which you are connecting this cable should already be installed in your system. If not, refer to the option instructions for the communications adapter, and install it before continuing.

- 1 Connect the serial adapter cable (9-pin end) to the communications adapter.



- 2 Connect the other end of the cable (25-pin end) to the modem or any other RS-232C data communications equipment.



- 3 If you have other external options that need to be installed, continue with the installation procedures for those options. If not, go to "System Checklist," page 2-3.

SECTION 5. TESTING YOUR SYSTEM

Problems with your system can be caused by software, hardware, or both. This section will help you determine the cause of a problem and what to do about it.

Note: Use this section to test *only* IBM products. Non-IBM products may give invalid errors or system responses.

Some devices that attach to your system have manuals with test instructions, which you should refer to when testing those devices.

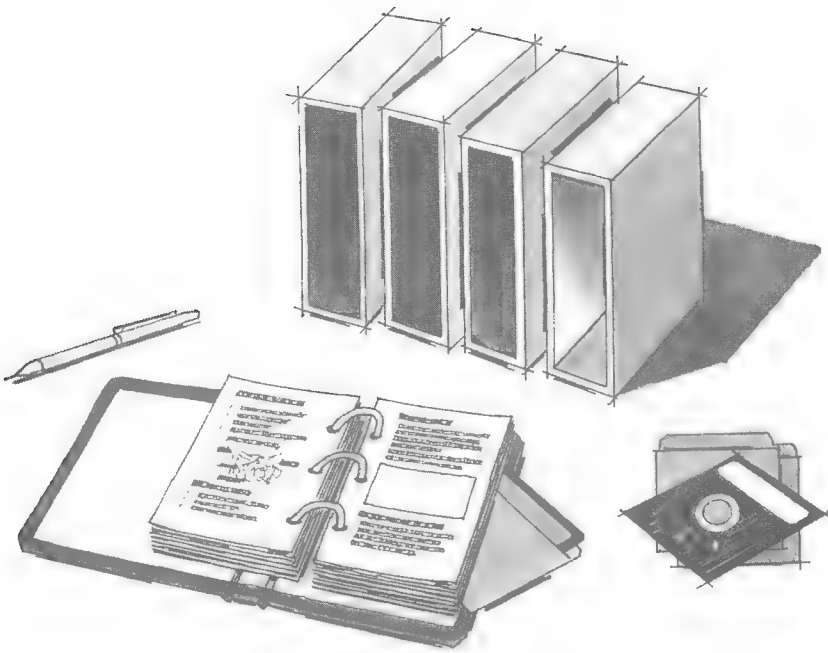
If you are not having problems with your system and just want to verify that it is operating correctly, begin with "System Tests" on page 5-11.

If you decide to return your system for service, remember to bring the power cords and keys. This manual has the information you need for moving your system in Section 3.

Some options that you may add to your system have replacement or additional pages for this section and a Diagnostics diskette. Compare the date of the replacement pages with the date of the pages in this "Testing" section. Keep the pages with the later date. Compare the version number of the Diagnostics diskette with the version number of the Diagnostics diskette in this manual. Keep the diskette with the higher version number.

First, make a note of any symptoms or messages you may have received then continue with the next page.

Software



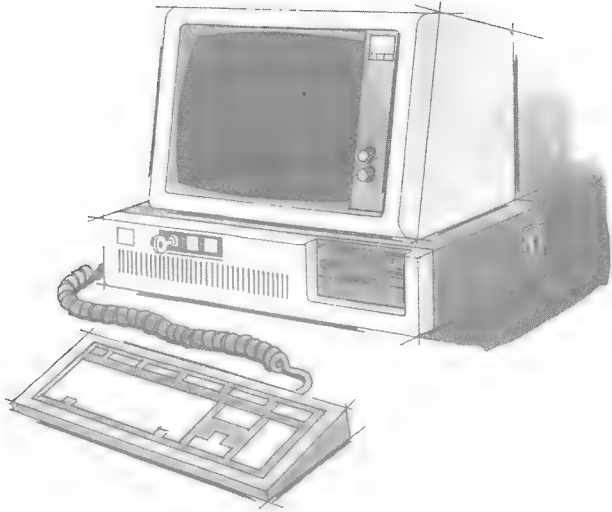
When using software, you may receive error messages. You should refer to the software manual for a description of those messages.

Before you continue, ensure that:

- The software is designed for your system.
- Your system meets the minimum requirements to use the software.
- Your software works on another system.

If the items listed above do not help, continue with “Hardware” on the next page.

Hardware



Before you continue, ensure that:

- The electrical outlet is working.
- The 115V - 230V selector switch is set correctly.
- All cables and power cords are connected properly.
- Everything is turned on.
- Contrast and Brightness controls are adjusted properly.

If you have just installed an option, ensure that:

- The option is designed for your system.
- The option was installed according to the instructions.

If the items listed above do not help, continue with “Self-Test” on the next page.

Self-Test

Your system performs an automatic self-test each time you turn it on. Follow these steps to observe the self-test.

Pay close attention to the beeps.

- 1 Turn off your system.
- 2 Get the Diagnostics diskette from the back of this manual.
- 3 Load the diskette into drive A.
- 4 Turn on your system.
- 5 The memory size appears in the top left corner of the screen and increases until it matches the amount of memory installed in your system.



XXXXX KB OK

- 6 Did your system respond in the following manner?

- Diskette drive light flashes.
- One clear BEEP.

YES Continue with the next step.

NO Go to "Setup Messages" on page 5-6.

7

The following screen appears.

**The IBM Personal Computer
DIAGNOSTICS
Version X.XX
(C)Copyright IBM Corp. XXXX, XXXX**

SELECT AN OPTION

**0 – SYSTEM CHECKOUT
1 – FORMAT DISKETTE
2 – COPY DISKETTE
3 – PREPARE SYSTEM FOR MOVING
4 – SETUP
9 – END DIAGNOSTICS**

**SELECT THE ACTION DESIRED
?**

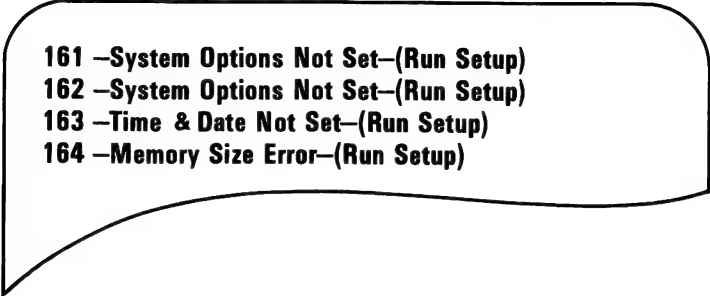
If your system did not respond as described, continue with “Setup Messages” on the next page.

If the correct responses occurred, but you still suspect a problem, go to “System Tests” on page 5-11.

Setup Messages

If you received any of the following messages, continue with “Running the Setup Program” on this page.

If you did *not* receive any of the following messages, continue with “Self-Test Error Messages” on page 5-7.



- 161 –System Options Not Set–(Run Setup)**
- 162 –System Options Not Set–(Run Setup)**
- 163 –Time & Date Not Set–(Run Setup)**
- 164 –Memory Size Error–(Run Setup)**

Running the Setup Program

This program allows you to tell your system the date, time, and what type of options you have installed. Press **F1** and follow the instructions on your screen. Refer to the “Setup Information” foldout as you answer the Setup program questions.

If you have problems running the Setup program, refer to “Setup Program” in Section 2 of this manual.

If you cannot correct the setup message, have the system unit serviced.

Note: If you have to run the Setup program each time you turn on your system because you receive the following message, replace your battery.



161 – System Options Not Set–(Run Setup)

Self-Test Error Messages

Find the message you received and take the action described.

302 –System Unit Keylock is Locked

Action Unlock the system unit key lock and press **F1**.
If the key lock is unlocked, have the system unit serviced.

**6XX – Diskette Boot Record Error
or
Diskette Boot Failure**

(X can be any number.)

Action Make sure you are using the Diagnostics diskette and that it is loaded correctly.

Try to start the Diagnostics diskette again. If you still cannot start diagnostics, have the system unit serviced.

If you did not receive either of the error messages listed above, continue on the next page.

If you received any of the following messages, take the action described.

105 —Keyboard or System Unit Error
301 —Keyboard Error
303 —Keyboard or System Unit Error
304 —Keyboard or System Unit Error

Action Make sure nothing is resting on the keyboard holding a key down. If nothing is holding a key down, try the following:

1. Turn off the system unit.
2. Unplug the keyboard from the system unit.
3. Turn on the system unit.

If a **301** error remains, have the keyboard and keyboard cable serviced.

If a **105**, a **303** or a **304** error remains, have the system unit serviced.

If you did not receive any of the error messages listed above, continue on the next page.

If you received any of the following messages, have the system unit serviced. (X can be any number.)

1XX-System Board Error
20X-Memory Address Error
401-CRT Error
501-CRT Error
1780-Disk 0 Failure
1781-Disk 1 Failure
1782-Disk Controller Failure
1790-Disk 0 Error
1791-Disk 1 Error
22XX-Cluster Failure
30XX-Network Failure
 except 3015* and 3042*
31XX-Network Failure
 except 3115* and 3142*
ROM Error
????
Parity Check 1
Parity Check 2

If you did not receive any of the error messages listed above, continue with "Failure Symptoms" on the next page.

*If you receive one of these errors, have the network serviced.

Failure Symptoms

If your system has any of the following symptoms, take the action described. If your system has more than one of the symptoms, take the action described for the *first* symptom.

SYMPTOM	ACTION
No BEEP	Have the system unit serviced.
More than one BEEP	Have the system unit serviced.
None of the keys on the keyboard work	Have system unit, keyboard, and cable serviced.
Only some of the keys on the keyboard work	Have the keyboard and cable serviced.
Totally blank screen	Continue with "Display Problems" on page 5-17.
No cursor displayed	Have the system unit serviced.
Only the cursor is displayed	Have the system unit serviced.
Screen is unreadable	Continue with "Display Problems" on page 5-17.
Missing characters on the screen	Continue with "System Tests" on the next page.
Wrong characters on the screen	Have the system unit serviced.

If your system does not have any of the symptoms listed above, continue with "System Tests" on the next page.

System Tests

If you have already loaded the Diagnostics diskette, begin with Step 6 on page 5-12.

- 1 Turn off the system unit.
- 2 Get the Diagnostics diskette from the back of this manual.
- 3 Load the diskette into drive A.
- 4 Turn on the system unit.
- 5 If you receive the following message, press the F1 key and continue.

(RESUME="F1"KEY)

6 You will need a blank formatted diskette for each drive installed in your system. Before formatting a diskette remember:

- Use the correct diskette for each type of drive you have. For example, format only a high capacity diskette in a high capacity drive.
- If you cannot format the diskette, try another diskette. If the second diskette cannot be formatted either, have the system unit serviced.

7 Select **1 - FORMAT DISKETTE** and follow the instructions on the screen to format a diskette for *each* drive.

SELECT AN OPTION

- 0 - SYSTEM CHECKOUT**
- 1 - FORMAT DISKETTE**
- 2 - COPY DISKETTE**
- 3 - PREPARE SYSTEM FOR MOVING**
- 4 - SETUP**
- 9 - END DIAGNOSTICS**

ENTER THE ACTION DESIRED

?

8 When the screen above reappears, make sure the Diagnostics diskette is in Drive A.

9 Select 0 - SYSTEM CHECKOUT.

During testing, questions about your installed options may appear. Answer as required.

- 10 A list will appear describing installed devices. If the list is correct, press **Y** then **Enter**(**↵**) and continue with the next step.

Note: If your printer is missing from the list, press **Y** then **Enter** (**↵**) and continue with the next step. When you have completed "System Tests," go to "Printer Problems" page 5-21.

If the list is incorrect, have your system unit serviced.

11 The system will now begin testing itself.

Note any error messages that appear.

During the tests you will be asked to answer questions, test the keyboard, and verify screen characters and images. One of the screens that will appear is shown here so that you can compare it to the Character Set displayed on your system.

CHARACTER SET

☺ ☹ ♥ ♦ ♣ ♠ 🗲 🔐 ♂ ♀ 🎵 🎸 🪘 ▶ ◀ 🔌 !! # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢ £ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ à á â ã ä å æ ç è é ê ë ì í î ï ñ ò ó ô õ ö ø ù ú û ü ý þ ÿ

12 Did the following screen appear indicating your system has finished testing?

SELECT AN OPTION

0 – SYSTEM CHECKOUT

1 – FORMAT DISKETTE

2 – COPY DISKETTE

3 – PREPARE SYSTEM FOR MOVING

4 – SETUP

9 – END DIAGNOSTICS

ENTER THE ACTION DESIRED

?

YES

If you noted an error message or still suspect a problem, continue with the next step.

NO

Have your system unit serviced.

- 13** Look for your symptom in the following figure. If your system has more than one of the symptoms, take the action described for the first symptom.

SYMPTOM	ACTION
Any 3XX error message	Have the keyboard and cable serviced.
Key lock does not lock out keyboard	Have the system unit serviced.
Display problems	Continue with "Display Problems" on the next page.
432 error message	Continue with "Printer Problems" on page 5-21.
Any printer error or problems	Continue with "Printer Problems" on page 5-21.
Tests stop and you cannot continue	Have the system unit serviced.
Any other error message	Have the system unit serviced.

(X can be any number.)

If you have reached this point and still suspect a problem, you may want to seek technical assistance. A focal person trained to help with specific technical problems, such as communications, may be available at your location or place of purchase.

Display Problems

Make sure that the display or television controls are adjusted properly.

If you are using a television, verify that it is working correctly by disconnecting the TV from the system and operating the TV normally.

Some displays have their own tests. Check the instructions that came with your display for any self-tests that may have been included.

IBM Monochrome Display

If you are having problems with a monochrome display and received one beep when you turned on the system unit, have the display serviced. If you received any other audio response, have the system unit serviced.

IBM Color Displays

If you are having problems with an IBM color display, continue on the next page.

1 Turn on the system unit.

2 Turn on the display.

3 Turn off the system unit.

Did the screen change to white?

YES Go to Step 7.

NO Continue with the next step.

4 Turn off the display.

5 Disconnect the display signal cable from the system.

6 Turn on the display.

Is the screen white?

YES Have the system unit serviced.

NO Have the display serviced.

7 While watching the screen, turn on the system unit.

Did the screen change from white to black?

YES Continue with the next step.

NO Have the display serviced.

- 8** If your display has one of the following symptoms, take the action described.

SYMPTOM	ACTION
Blank screen	Have the system unit serviced.
Wrong or missing colors	Have the display serviced.

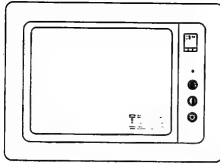
If the symptom is not listed, continue with the next step.

- 9** Operate the controls listed below:

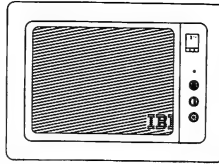
- Brightness
- Contrast
- Vertical Hold
- Vertical Size.

If any of the controls listed above do not work, have the display serviced. If all of the controls work, continue with the next step.

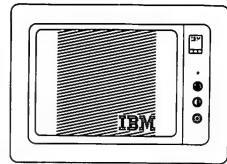
10 Is the problem similar to the examples shown below?



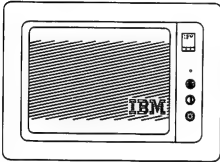
Too Dim



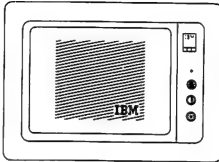
Too Wide



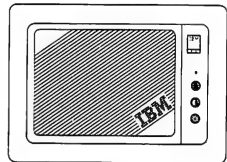
Too Narrow



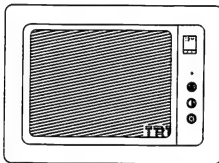
Too Short



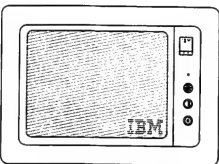
Too Small



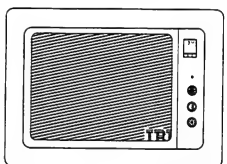
Tilted



**Changes Size When
Brightness Control
Turned**



Out of Focus



**Characters Shifted
Left or Right, or
Up and Down Off
the Display Area**

YES Have the display serviced.

NO Have the system unit serviced.

Printer Problems

Refer to the manual that came with your printer and check to see if your printer is:

- Turned on
- Ready (Online).

Printers may have their own tests. Refer to the manual that came with your printer and run the printer tests. If the printer tests work, have the system unit serviced. If the printer tests do not work, have the printer and cable serviced.

Notes:

Appendix A. KEYBOARD TEMPLATES

Introduction	A-3
French	A-5
German	A-7
Italian	A-9
Spanish	A-11
U.K. English	A-13
U.S. English	A-15

Notes:

Introduction

This section contains layouts for some of the national language keyboards available for use with the IBM Personal Computer. They show keytop characters and key locations supported by a national language keyboard routine (KEYBxx). Additional available characters are listed on the back of each layout. All templates and languages (except U.S. English) are for the 102-key keyboard. If they are used with a U.S. English 101-key keyboard, not all characters will be available. The shaded areas on the keyboard templates are keys that are not available if used on the U.S. English keyboard.

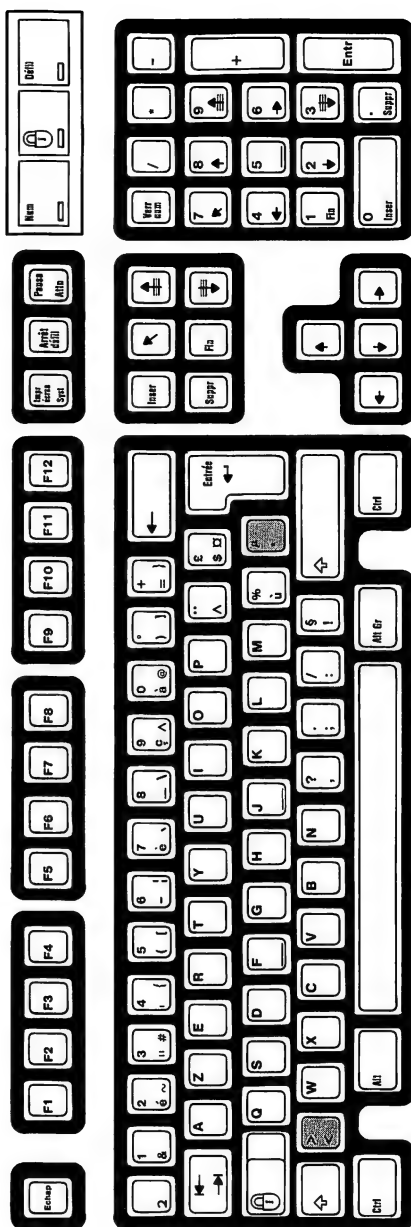
If you do not use DOS, your keyboard converts all keystrokes as if you had a U.S. English keyboard. You should use the U.S. English template as a guide.

Note: To type a character that is on the front face of a keytop, press and hold the right **Alt** key, then press the key with the desired character.

Notes:

French

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CARACTERES SUPPLEMENTAIRES



1. Appuyez et maintenez

2. Frappez le code de trois chiffres sur le clavier numérique.



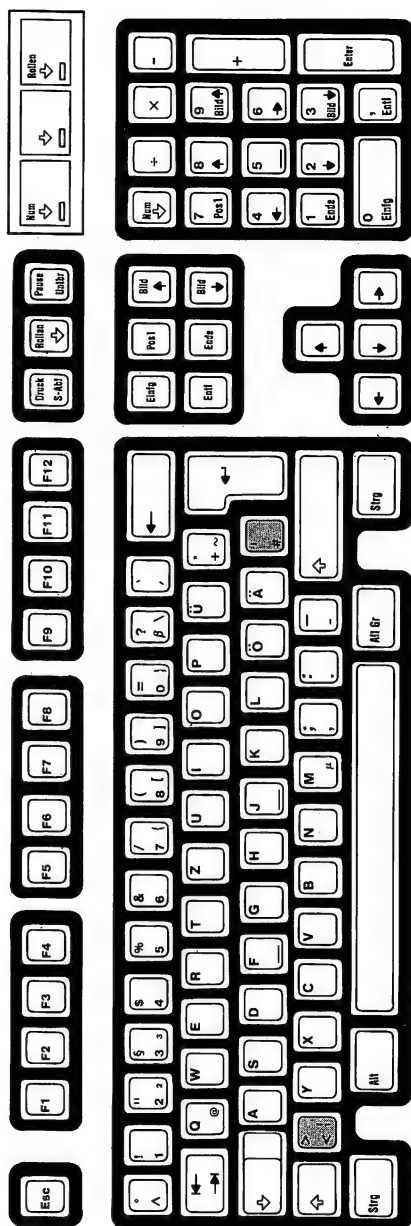
3. Relachez

096	'	145	œ	164	ñ	175	»	234	Ω	245	J
123	!	146	Æ	165	Ñ	224	∞	235	δ	246	÷
124	;	149	ö	166	ä	225	β	236	∞	247	≈
125		155	ç	167	ö	226	Γ	237	Ø	249	•
126	~	157	₣	168	ı	227	π	238	€	250	•
127	□	158	Pls	169	—	228	Σ	239	∩	251	√
128	Ç	159	f	170	—	229	σ	240	≡	252	°
134	ä	160	ä	171	½	230	μ	241	+	253	²
141	ı	161	ı	172	¼	231	τ	242	≥	254	■
143	Å	162	ö	173	ı	232	Φ	243	≤		
144	É	163	ú	174	«	233	Θ	244	∩		

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German

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ZUSÄTZLICHE ZEICHEN



1.

Betätigen und halten.

2. Ein 3-Zahlencode auf der Addiermaschinentastatur eingeben.



3.

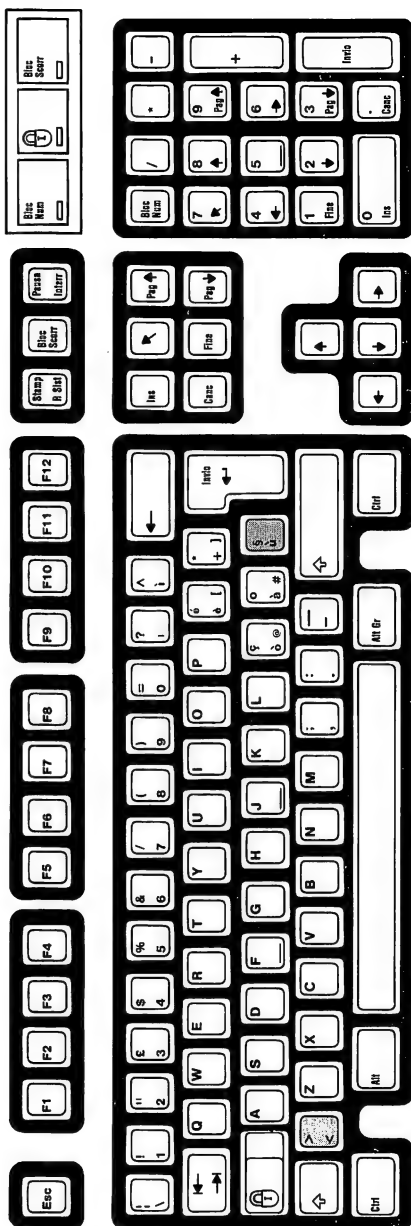
loslassen.

123	!	140	!	158	Pts	173	!	233	Ø	244	¡
124	!	141	!	159	f	174	«	234	Ω	245	J
125	!	143	Ä	164	ñ	175	»	235	ó	246	÷
126	~	145	æ	165	Ñ	224	œ	236	∞	247	≈
127	□	146	Æ	166	ä	226	┐	237	Ø	248	°
128	Ç	147	ö	167	ö	227	π	238	€	249	•
131	ä	150	ü	168	¿	228	Σ	239	∩	250	•
134	å	152	ÿ	169	┐	229	σ	240	≡	251	√
135	ç	155	¢	170	┐	230	μ	241	±	252	°
136	é	156	£	171	½	231	τ	242	≥	253	²
139	!	157	₣	172	¼	232	Ω	243	≤	254	■

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Italian

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CARACTERES ADICIONALES



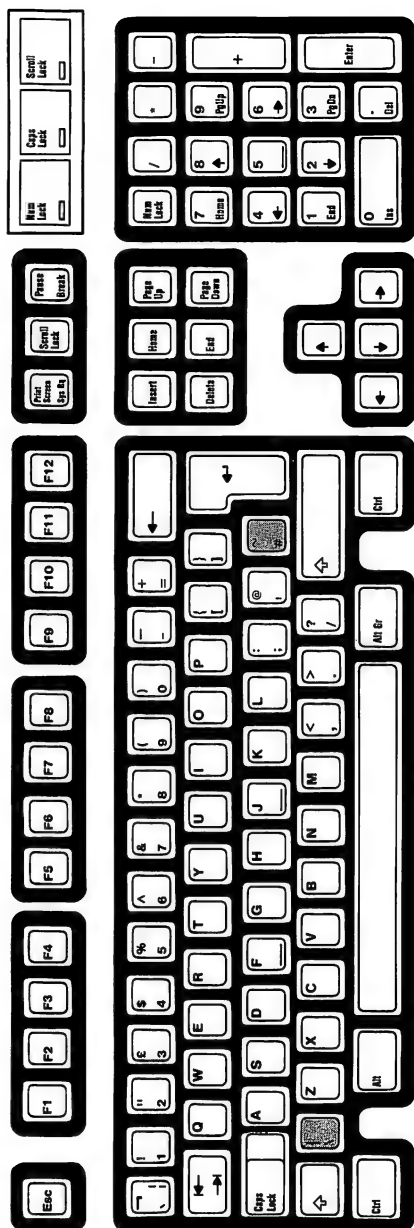
1. Pulse y manténga pulsada la tecla 
2. Teclee un código de 3 dígitos en el teclado numérico (Lado derecho del teclado)
3. Libere 

123	!	156	£	172	¼	230	μ	239	∩	248	°
124	;	157	₣	174	«	231	τ	240	≡	249	•
125)	158	Pls	175	»	232	ϕ	241	÷	250	•
126	~	159	f	224	œ	233	θ	242	≥	251	∧
127	◊	166	₧	225	β	234	Ω	243	≤	252	ⁿ
134	ä	167	q	226	┐	235	δ	244	┌	253	²
145	œ	169	└	227	π	236	∞	245	┐	254	■
146	Æ	170	└	228	Σ	237	∅	246	+		
155	¢	171	½	229	σ	238	€	247	≈		

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ADDITIONAL CHARACTERS



1. Press and hold

2. Type 3-digit code on numeric keypad.



3. Release

127	Q	141	ı	155	¢	169	┌	231	ı	246	+
128	Ç	142	Ä	156	£	170	┐	232	Ö	247	≈
129	Ü	143	Å	157	₣	171	½	234	Œ	248	•
130	É	144	Ê	158	Pls	172	¼	235	ó	249	•
131	ä	145	æ	159	f	173	ı	236	∞	250	•
132	ä	146	Æ	160	ä	174	«	237	Ø	251	√
133	ä	147	ö	161	ı	175	»	238	£	252	n
134	ä	148	ö	162	ö	224	œ	239	Œ	253	z
135	Ç	149	ö	163	ü	225	β	240	≡	254	■
136	é	150	ü	164	ñ	226	Γ	241	±	255	
137	ë	151	ü	165	Ñ	227	π	242	≡		
138	è	152	ÿ	166	ä	228	Σ	243	≡		
139	ı	153	Ö	167	ö	229	σ	244	ı		
140	ı	154	Ü	168	ç	230	μ	245	ı		

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The image displays several different keyboard layouts and components, likely representing various models or configurations of a specific keyboard brand. The components include:

- Top Left: Control and Lock Keys**
 - Buttons: Num Lock, Caps Lock, Scroll Lock.
 - Each button has a small indicator light.
- Top Right: Numeric Keypad**
 - Buttons: 0-9, Enter, and function keys like Home, End, Up, Down, Left, Right.
 - Buttons are arranged in a standard numeric keypad layout.
- Middle Left: Function Key Row**
 - Buttons: F1 through F12.
 - Buttons are arranged in a single row.
- Middle Right: Directional Keypad**
 - Buttons: Up, Down, Left, Right arrow keys.
 - Buttons are arranged in a cross pattern.
- Bottom: Full QWERTY Keyboard**
 - Buttons: Standard QWERTY layout, including letters, numbers, punctuation, and function keys.
 - Buttons are arranged in a standard QWERTY layout.

ADDITIONAL CHARACTERS



1. Press and hold

2. Type 3-digit code on numeric keypad.



3. Release

096	·	140	ì	154	ü	169	┌	231	τ	245	Ј
127	□	141	í	155	ƒ	170	┐	232	ϕ	246	+
128	Ç	142	â	157	Ÿ	171	½	233	ϑ	247	≈
129	ü	143	Á	158	Pls	172	¼	234	Ω	248	◦
130	é	144	É	159	f	173	í	235	ó	249	•
131	ä	145	æ	160	á	174	«	236	∞	250	•
132	ä	146	Æ	161	í	175	»	237	∅	251	√
133	ä	147	ö	162	ö	224	œ	238	€	252	ⁿ
134	ä	148	ö	163	ü	225	β	239	∩	253	²
135	ç	149	ö	164	ñ	226	┐	240	≡	254	■
136	è	150	ü	165	Ñ	227	π	241	±		
137	ë	151	ü	166	ä	228	Σ	242	≥		
138	è	152	ý	167	ö	229	σ	243	≤		
139	í	153	ö	168	ü	230	μ	244	∫		

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Glossary

This glossary includes terms and definitions from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699.

adapter. (1) A printed circuit board that plugs into the system board allowing an external option to be attached to the system unit. (2) Any printed circuit board that plugs into the system board.

backup. Duplicating data from a fixed disk drive or diskette to a diskette which ensures availability of data in the event of loss or damage to the original.

BASIC. (1) Beginner's all-purpose symbolic instruction code. (2) A programming language that uses common English words.

BSC (binary synchronous communications). A uniform procedure, using a standardized set of control characters and control character sequences for synchronous transmission of binary-coded data between stations.

computer. A functional unit that can perform substantial computation, including numerous arithmetic operations or logic operations, without human intervention during a run.

computer program. A sequence of instructions suitable for processing by a computer.

configuration. The devices and programs that make up a system, subsystem, or network.

CRT. Cathode ray tube. See display.

current. The rate at which electrical charges flows.

cursor. (1) In computer graphics, a movable marker that is used to indicate a position on a display. (2) A displayed symbol that acts as a marker to help the user locate a point in text, in a system command, or in storage. (3) A movable spot of light on the screen of a display device, usually indicating where the next character is to be entered, replaced, or deleted.

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means.

device. An electronic piece of equipment with a specific purpose.

Diagnostics diskette. Diskette with programs designed to detect and isolate failing parts of the system.

diskette. A thin, flexible magnetic disk and a semirigid protective jacket, in which the disk is permanently enclosed. Synonymous with flexible disk.

diskette drive. A device for storing data on and retrieving data from a diskette.

diskette, double-sided. A thin, flexible disk treated magnetically to store data on both sides.

diskette, single-sided. A thin, flexible disk treated magnetically to store data on one side only.

display. A device for visual presentation of information on any temporary character imaging device.

DOS. See operating system.

double-sided diskette. See diskette, double-sided.

external option. See option, external.

FCC. Federal Communications Commission.

file. (1) A group of related records as a data file.
(2) To store data as a file, so that it can be retrieved.

fixed disk drive. In the IBM Personal Computer, a unit consisting of nonremovable magnetic disks, and a device for storing data on and retrieving data from the disks.

flexible disk. Synonym for diskette.

format. To prepare a diskette to receive data in an organized fashion.

hardware. (1) Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (2) Contrast with software.

internal option. See option, internal.

K. 1024 bytes.

KB. 1024 bytes.

key lock. A device that deactivates the keyboard and locks the cover on for security.

load. In programming, to enter data into storage or working registers.

M. 1,048,576 bytes.

MB. 1,048,576 bytes.

memory. Term for main storage.

modem (modulator-demodulator). A device that converts serial (bit by bit) digital signals from a business machine (or data communication equipment) to analog signals that are suitable for transmission in a telephone network. The inverse function is also performed by the modem on reception of analog signals.

monitor. Synonym for cathode ray tube display (CRT display).

monochrome display. A display on which data appears in only one color.

operating system. Software that controls the execution of programs; an operating system may provide services such as resource allocation, scheduling, input/output control, and data management.

option, external. Devices attached to the outside of the system unit which extend and enhance its operation. Examples: display, printer or modem.

option, internal. Parts installed inside the system unit covers which enhance operation of the system such as adapters and memory options.

parallel. (1) Pertaining to the concurrent or simultaneous operation of two or more devices, or to the concurrent performance of two or more activities. In this book, serial and parallel refers to devices, as opposed to sequential and consecutive, which refer to processes. (2) Contrast with serial.

parity check. (1) A redundancy check that uses a parity bit. (2) Synonymous with odd-even check.

peripheral. Device attached to a system unit.

personal computer. A home or business computer that has a processor and keyboard and that can be connected to a television or some other monitor.

port. An access point for data entry or exit.

program. (1) A series of actions designed to achieve a certain result. (2) A series of instructions telling the computer how to handle a problem or task. (3) To design, write, and test computer programs.

programming language. (1) An artificial language established for expressing computer programs. (2) A

set of characters and rules with meanings assigned prior to their use, for writing computer programs.

RS-232C. A standard by the Electronic Industries Association (EIA) for communication between computers and external equipment.

run. A single continuous performance of a computer program or routine.

serial. (1) Pertaining to the sequential performance of two or more activities in a single device. In this book, serial and parallel refer to devices, as opposed to sequential and consecutive, which refer to processes. (2) Contrast with parallel.

setup. The preparation of the system for normal operation.

Setup Program. One of several programs on the Diagnostics diskette that allows a user to set the date, time and options.

single-sided diskette. See diskette, single-sided.

software. (1) Computer programs, procedures, and rules concerned with the operation of a data processing system. (2) Contrast with hardware.

store. (1) To place data into a storage device. (2) To retain data in a storage device.

storage. (1) A storage device. (2) A device, or part of a device, that can retain data. (3) Diskette. (4) Fixed disk drive.

synchronous transmission. (1) Data transmission in which the time of occurrence of each signal representing a bit is related to a fixed time frame. (2) Data transmission in which the sending and receiving devices are operating continuously at substantially the same frequency and are maintained, by means of correction, in a desired phase relationship.

system. A computer configuration including at least a system unit, a keyboard, and a display.

system unit. Main part of the computer configuration.

typematic. Keyboard key that repeats its function when held pressed.

V. Volts.

write. To make a permanent or transient recording of data in a storage device or on a data medium.

Index

A

adapter
 binary synchronous
 communications 4-39
 cluster 4-55
 color/graphics
 monitor 4-30
 data acquisition and
 control 4-53
 display 4-30
 enhanced graphics 4-45
 game control 4-43
 general purpose interface
 bus 4-51
 graphics memory
 expansion 4-47
 installation 4-62
 monochrome display and
 printer 4-30
 network 4-57
 professional graphics
 controller 4-49
 prototype 4-59
 serial/parallel 4-34
 synchronous data link
 control
 communications 4-41
 adapter installation 4-62

B

back panel 2-5, 4-6
BASIC 3-8
battery 2-13, 4-8
battery problems 5-1
binary synchronous
 communications
 adapter 4-39

C

cable
 communications 4-95
 serial adapter 4-97
cabling your system unit 2-3
caps lock
 key 3-11
 light 3-11
checklist, system 2-3
cluster adapter 4-55
color display 3-19, 4-83
color display mode 2-13,
 3-19, 4-84
color printer 4-93
color/graphics monitor
 adapter 4-30
communications cable 4-95
control key area 3-11
coprocessor, math 4-10
cover
 installation 4-76
 mounting screws 4-7
 removal 4-5

cursor controls 3-11

D

data acquisition and control

adapter 4-53

date and time 2-13, 3-20

diskette

compatibility 3-14

Diagnostics 2-13

double sided 3-14

Exploring 3-3

high capacity 3-14

inserting 3-16

loading 3-16

removing 3-16

single sided 3-14

write-protect 3-15

diskette drives

compatibility 3-14

double sided 3-13, 4-14,
4-29

high capacity 3-13, 4-14

in-use light 3-13, 3-16,
4-14

installation 4-14

operating 3-13

1.2MB 4-29

360KB 4-29

display

adapter installation 4-30,
4-45, 4-49

brightness 3-19

color 3-19, 4-83

contrast 3-19

controls 3-19

enhanced color 4-85

mode 2-13, 3-19, 4-84

monochrome 3-19, 4-81

operating 3-19

problems 5-1

professional

graphics 4-87

display mode 2-13, 3-19,
4-84

display signal cable 2-7

display switch 4-32

DOS A-3

double sided drive 3-13,
4-14, 4-29

drive

double sided 3-14, 4-14,
4-29

fixed disk 3-17

high capacity 3-13, 3-14,
4-14

E

electrical safety v

enhanced color display 4-85

enhanced graphics

adapter 4-45

error

memory 5-1

setup 2-13, 5-1

testing 5-1

161 2-13, 5-1

162 2-13, 5-1

163 2-13, 5-1

164 2-13, 5-1

301 5-1

401 - CRT 5-1

432 5-1

501 - CRT 5-1

601 5-1

Exploring The IBM Personal
Computer AT 3-3

external option 1-1, 4-79

F

fixed disk
 drive 3-17
 moving 3-20
 type 4-9
floor standing option 4-65
function key area 3-10

G

game control adapter 4-43
general purpose interface bus
 adapter 4-51
graphics memory expansion
 card 4-47
graphics memory module
 kit 4-48

H

hardware 1-2, 5-1
high capacity drive 3-13,
 3-14, 4-14, 4-29
home row identifiers 3-9

I

IBM BASIC 3-8
in-use light 3-13, 3-16, 3-17,
 4-14
internal option 1-1, 2-1, 4-3

K

key, ordering 3-18
keyboard
 control key area 3-9, 3-11
 function key area 3-9,
 3-10
 height adjustment 3-12
 keyboard 3-9
 numeric keypad area 3-9,
 3-10
 status light area 3-9, 3-11
 templates A-3
 typewriter area 3-9
 101-key 3-9, A-3
 102-key 3-9, A-3
keyboard templates
 French A-5
 German A-7
 Italian A-9
 Spanish A-11
 U.K. English A-13
 U.S. English A-15
keylock
 key 3-17, 3-18
 number 3-18
 panel 3-17

L

lights
 diskette drive in-use 3-13,
 3-16, 4-14
 fixed disk in-use 3-17
 power-on indicator 3-17
 status 3-11
loading the diskette 3-16
lock
 key 3-17
 number (#1501419) 3-18

security 3-17, 3-18
lock number
 (#1501419) 3-18
LPT1 4-37, 4-38
LPT2 4-37, 4-38
LPT3 4-37, 4-38

M

math coprocessor 4-10
memory
 error 5-1
 graphics expansion
 card 4-47
monochrome display 3-19,
 4-81
monochrome display and
 printer adapter 4-30
moving your IBM Personal
 Computer AT
 long distance move 3-24
 moving your system 3-20
 new location 3-24
 preparing to move your
 system 3-20

N

network adapter 4-57
number, lock
 (#1501419) 3-18
numeric keypad area 3-10
numeric keypad
 identifier 3-10
numeric lock (Num Lock)
 key 3-10, 3-11

O

option
 external 1-1, 4-79
 installation 4-3, 4-79
 internal 1-1, 2-1, 4-3
ordering a key 3-18

P

power-on indicator light 3-17
power switch 2-6
preparing to move your
 system 3-20
primary display switch 4-32
printer
 cabling 2-8
 color 4-93
 problems 5-1
problems 5-1
professional graphics
 controller 4-49
professional graphics
 display 4-87
program 1-3, 3-8
prototype adapter 4-59

R

recording serial numbers
 key 3-18
 system unit 2-4
removing the diskette 3-16

S

safety v
security key lock/indicator
assembly 3-17
selector switch 2-3
serial adapter cable 4-97
serial numbers
key 3-18
system unit 2-4
serial/parallel adapter 4-34
Setup
error 5-1
program 2-13
software 1-3, 5-1
status light area 3-11
synchronous data link control
communications
adapter 4-41
system
checklist 2-3
complete 1-1
test 5-1
unit 3-8
system unit 3-8
power-on indicator 3-17
power switch 2-6

T

templates
French A-5
German A-7
Italian A-9
Spanish A-11
U.K. English A-13

U.S. English A-15
templates, keyboard A-3
testing your system 5-1
time and date 2-13, 3-20
typematic 3-9

V

voltage selector switch 2-3

W

write-protect 3-15

Numerics

1.2MB diskette drive 4-29
101-key keyboard 3-9, A-3
102-key keyboard 3-9, A-3
115V - 230V selector
switch 2-3
161 error 2-13, 5-1
162 error 2-13, 5-1
163 error 2-13, 5-1
164 error 2-13, 5-1
301 error 5-1
360KB diskette drive 4-29
40-column mode 3-19, 4-84
401 - CRT error 5-1
432 error 5-1
501 - CRT error 5-1
601 error 5-1
80-column mode 3-19, 4-84

Notes:



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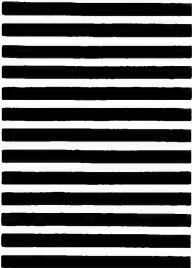


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